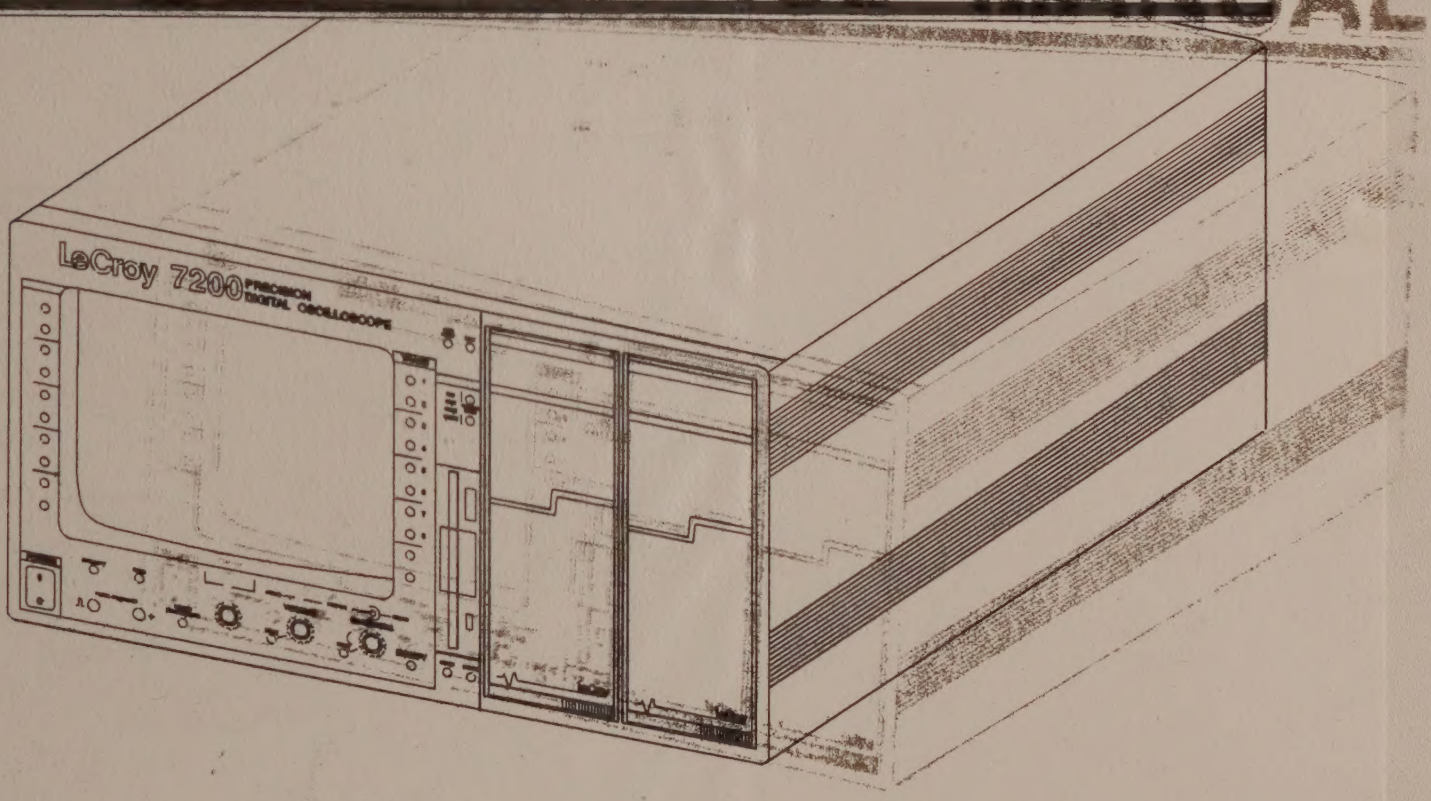
LeCroy 7200 PRECISION DIGITAL OSCILLOSCOPE

7200 SERVICE MANUAL



SECTION 1 GENERAL INFORMATION

This manual describes how to maintain the LeCroy 7200 Precision Digital Oscilloscope. For ease of reference, this equipment is referred to as the 7200 Mainframe throughout this manual.

1-1 **WARNING** and **CAUTION** Statements in Manual

WARNING statements describe conditions or practices which, if not followed, could result in personal injury or loss of life.

CAUTION statements describe conditions or practices which, if not followed, could result in damage to equipment or property

1-2 **WARNING** and **CAUTION** Statements on Equipment

DANGER statements describe personal injury hazards in immediately accessible areas of the 7200 Mainframe.

CAUTION statements describe personal injury hazards in areas not immediately accessible. These statements also may indicate hazards to equipment or property.

1-3 Safety Summary

AC POWER SOURCE

The 7200 Mainframe is intended for operation from an ac power source at a level not exceeding 250 volts rms between the two supply conductors (line and neutral), or between either supply conductor and ground.

PROPER GROUNDING

The 7200 Mainframe is a class 1 instrument. This classification means that the enclosure is connected to a protective earth ground through the three-conductor power supply cord and is properly grounded whenever the 7200 Mainframe is connected to a properly grounded ac utility outlet. Protective grounding minimizes shock hazard and is essential for safe operation by itself and whenever connected to external test equipment.

Any interruption in the protective earth connection creates a potential shock hazard from contact with accessible conductive parts, including knobs and controls which may appear to be non-conductive.

FUSES

Fuses of the proper type, current rating, voltage rating, and physical size must be in place in the fuse drawer before power is applied for testing. Use of the wrong type of fuse can create a fire hazard.

EXPLOSIVE ATMOSPHERE

The 7200 Mainframe is not intended to be operated in an atmosphere containing explosive or flammable gases.

1-4 ESD Precaution

The 7200 Mainframe contains electrostatic discharge (ESD) sensitive devices. For this reason, it is necessary to work on the 7200 Mainframe in an environment that minimizes exposure of the circuit board assemblies and components to conditions that could be destructive. Servicing of the 7200 Mainframe and its ancillary devices requires an awareness of the potentially destructive effects of ESD. Depending upon the relative humidity of the maintenance shop, seemingly simple and unrelated acts such as walking across a vinyl floor or picking up an ordinary polyethylene bag from a workbench can generate thousands of volts of electricity. If proper grounding practices are not used, accidental contact with one of the CMOS devices on a circuit board can result in its destruction.

The maintenance shop must be free of sources of static electricity. This means that neither the 7200 Mainframe nor any of its ancillary devices should be disassembled on a work surface of melamine or finished wood unless a properly grounded electrostatic mat is underneath.

A work chair padded with urethane foam can generate 18 thousand volts of static electricity if humidity is low. Chairs of finished wood, vinyl, and fiberglass should not be used and metal work chairs may be used only if properly grounded.

Personnel should not wear common clean room smocks, non-conductive shoes, or garments made of any material other than virgin cotton.

Common plastic bags, wraps, envelopes, bubble pack, foam, trays, tote boxes, vials, and parts bins should not be in the shop. All board assemblies should be placed in ESD-protective bags immediately upon removal and all new boards should not be removed from their ESD-protective bags until immediately before installation.

In addition, common spray cleaners, solder suckers, and soldering irons should not be used. Brushes with synthetic bristles should not be used for solvent cleaning, e.g., removal of rosin residue from circuit board assemblies.

Heat guns and blowers are potential sources of static electricity and all cleaning and drying operations are potential sources as well.

Increased ESD awareness has four major effects:

- All electronic components are assumed to be ESD-sensitive
- Sensitive components are not touched unless a properly grounded wrist strap is worn
- Sensitive components are transported, stored, and handled only in ESD-free environments
- ESD-sensitive components are tested only in a static-free environment

As a general approach to servicing the 7200 Mainframe and its ancillary devices, do the following:

1. Disconnect power from the 7200 Mainframe except when required for voltage checks and adjustments
2. Be sure the multimeter is properly grounded before checking power supply output levels
3. Wear a properly grounded wrist strap or touch the properly grounded 7200 Mainframe before removing any board, the hard disk drive, or the floppy drive
4. Wear a properly grounded wrist strap to remove any board from a plug-in
5. Ground the ESD-protective package containing replacement devices before opening to dissipate its static charge
6. Remove ESD-sensitive devices from their packaging immediately before installation. Avoid touching other parts, connections, and circuitry

7. Use only anti-static spray coolants for troubleshooting

1-5 Plug-In Module Installation and Removal

1-5.1 Installation

CAUTION

Plug-in modules should not be installed with 7200 Mainframe power on.

To install a plug-in module, use the following procedure:

a. Align groove on bottom of plug-in module (figure 1-1) with guide on bottom of plug-in compartment of 7200 Mainframe.

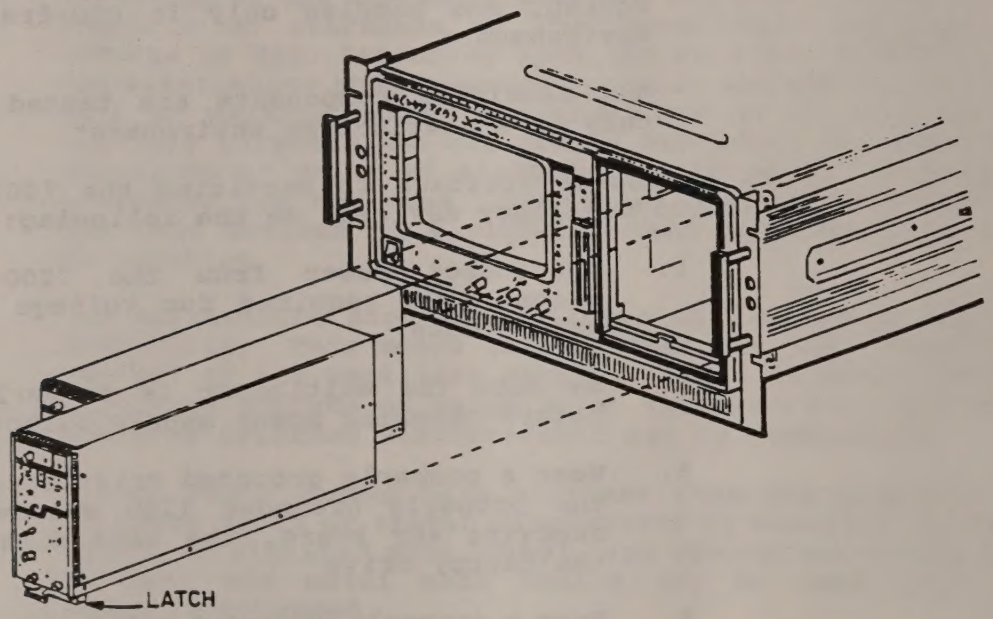


Figure 1-1. Plug-In Module Installation

b. Slide plug-in module into compartment until latched in place.

1-5.2 Removal

CAUTION

Plug-in modules should not be removed with 7200 Mainframe power on.

To remove a plug-in module, use the following procedure:

a. At bottom front of plug-in module, pull latch to release, then slide out of compartment.

1-6 Installation of New Software

NOTE

The MS-DOS Copy routine described in paragraph 1-7 should be used to save existing user files before a new version of the software is installed.

To install new software, use the following procedure:

a. Press Install softkey. Installation utility screen (figure 1-2) will be displayed.

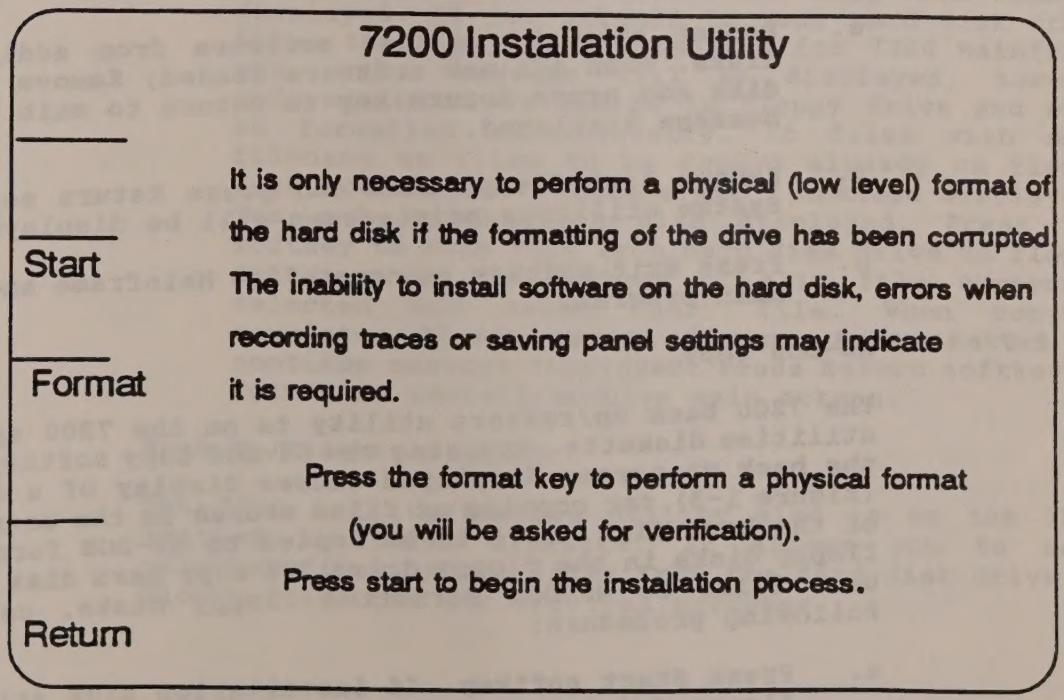

7200 Installation Utility
Start
Format
Return
It is only necessary to perform a physical (low level) format of the hard disk if the formatting of the drive has been corrupted. The inability to install software on the hard disk, errors when recording traces or saving panel settings may indicate it is required.
Press the format key to perform a physical format (you will be asked for verification).
Press start to begin the installation process.

Figure 1-2. Installation Utility Screen

Three softkeys are identified on the left side: Start, Format, and Return. The Start softkey is used to begin installation of new software. The Format softkey is used for hard (physical formatting of the hard disk drive. The Return softkey is used to exit from the installation routine and return to the main screen.

b. Press Start softkey to begin software installation. While software is being loaded, Installing message will be displayed.

c. If user partition (area where panel files and RCL programs stored) to be modified, Partition USER exists, do you want to erase all old files? message displayed along with Yes and No softkeys. Press Yes softkey to erase all old files, including panel setup and RCL programs. Press No softkey to keep old files on hard disk drive. Any files with same filename as new files will be overwritten. Installing... message displayed again, followed by Please insert disk 2 message when installation complete.

d. Insert disk 2 and installation will continue automatically.

e. Repeat step d. to load software from additional disks. When all new software loaded, Remove floppy disk and press Return key to return to main screen message displayed.

f. Remove last floppy disk and press Return softkey. System utilities main screen will be displayed.

g. Press Exit softkey to reset 7200 Mainframe and load main program.

1-7 MS-DOS Copy

The 7200 back up/restore utility is on the 7200 systems utilities diskette. Pressing the MS-DOS Copy softkey with the back up screen displayed causes display of a screen (figure 1-3) for copying of files stored in the user area of the hard disk drive to be copied to MS-DOS formatted floppy disks in the floppy drive. To copy hard disk drive user files to MS-DOS formatted floppy disks, use the following procedure:

a. Press Start softkey. If installation disk still in floppy drive, Please insert the copy disk message displayed. If you attempt to copy hard disk drive

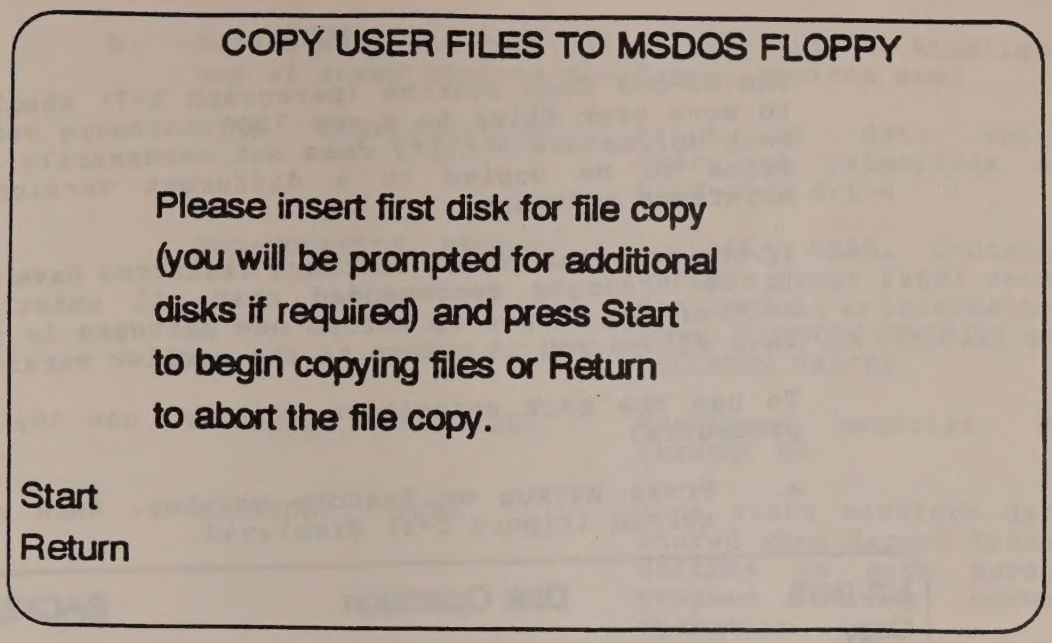

COPY USER FILES TO MSDOS FLOPPY
Please insert first disk for file copy
(you will be prompted for additional
disks if required) and press Start
to begin copying files or Return
to abort the file copy.
Start
Return

Figure 1-3. MS-DOS Copy Screen

a. Press Start softkey. If installation disk still in floppy drive, **Please insert the copy disk** message displayed. If you attempt to copy hard disk drive files to floppy disk formatted for 7200 Mainframe use, error message will be displayed, however unformatted disks can be in floppy drive and will be formatted automatically. If files with same filename as files to be copied already on floppy disk, **Overwrite "filename.ext"?** message displayed. **Yes** and **No** softkeys also displayed. Press **Yes** softkey to copy file from hard disk drive to floppy drive; press **No** softkey to skip file currently selected and select next file. When copying complete, **Please remove floppy. Press Return to continue** message displayed. Press Return softkey to return to install/archive main screen.

1-8 Back Up/Restore Utility

The 7200 back up/restore utility also is on the 7200 systems utilities diskette. It allows you to copy selected files or all files from the hard disk drive to floppy diskettes for archival purposes.

NOTE

The MS-DOS Copy routine (paragraph 1-7) should be used to move user files to a new 7200 software version. The Back up/restore utility does not necessarily allow user files to be copied to a different version of 7200 Mainframe software.

If the original system software diskettes have been lost, it is strongly recommended that all existing system software be backed up before new software is installed. This allows you to return to the earlier version easily.

To use the back up/restore utility, use the following procedure:

a. Press Backup or Restore softkey. Back up/restore screen (figure 1-4) displayed.

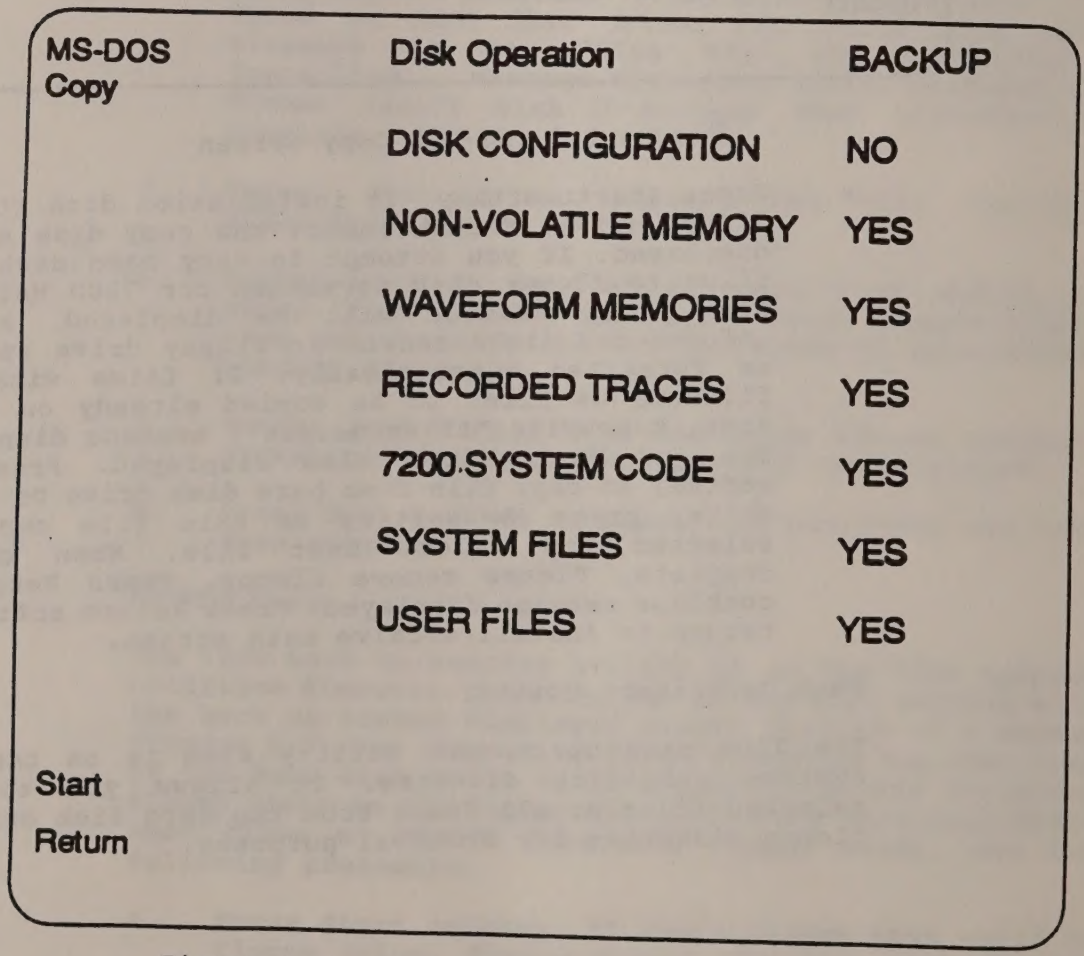


Figure 1-4. Back Up/Restore Utility Screen

b. Rotate Move Box knob (16, figure A-1) to highlight any of seven choices displayed. Choices are:

DISK CONFIGURATION	Block of data which describes properties of hard disk drive
NON-VOLATILE MEMORY	Actually BRAM. Contains current Front Panel setup data as well as information about WAVEFORM MEMORIES and RECORDED TRACES
WAVEFORM MEMORIES	Waveform memories M1 through M8
RECORDER TRACES	Area where waveform data stored when Record Traces softkey on main screen pressed during normal operation
7200 SYSTEM CODE	Area used to store program normally executed when power applied
SYSTEM FILES	Files stored on hard disk drive during software installation. Include device drivers, on-line help manual, waveform template, etc.
USER FILES	Panel setup and RCL program files (see paragraph 1-7)

The DISK CONFIGURATION area includes bad track information. For this reason, it is imperative that DISK CONFIGURATION information not be copied from the hard disk drive to the floppy drive. If you attempt to restore this information, the following message will be displayed: **Restoring the configuration to a different drive will destroy the bad track information. Is this the drive which was backed up?**

If this is the same disk, press YES.
Otherwise, press NO.

This message verifies that information is being restored to the drive from which it was saved.

The NON-VOLATILE MEMORY, WAVEFORM MEMORIES, and RECORDED TRACES areas are backed up or restored concurrently.

The 7200 SYSTEM CODE and SYSTEM FILES are backed up or restored concurrently.

d. Press Start softkey. Highlighting of choice removed and back up/restore operation begins.

As the back up/restore operation is performed, the CRT may display **You may now insert disk ...** messages when the program will need to access certain disks later during execution or **Please insert disk ...** messages when the program needs to access certain disks immediately. In this latter case, a beep will sound.

During a back up operation, a rough approximation of the number of floppy disks required is displayed. The number is updated (decreased) after each floppy disk is filled.

Floppy disks are formatted automatically. if necessary. If a writing error occurs, a message prompting for insertion of an alternate floppy disk will be displayed.

When a restore operation is begun, the first diskette is read to determine which areas were backed up. Areas selected for restoration but not on the floppy disk are indicated by display of the word **ABSENT**.

The program will not write on the 7200 configuration disk, the 7200 install disk, or the 7200 back up/restore disk. This prevents destruction of important information.

In some cases, it may be acceptable to write on a floppy disk, e.g., when a new disk of the same type is received from the factory. In this case, the floppy disk should be formatted by selecting the disk configuration setup screen and pressing the Format softkey before loading the 7200 back up/restore program.

During Back up and restore operations, a bar graph similar top the one shown in figure 1-5 is displayed at the bottom of the screen to indicate progress.

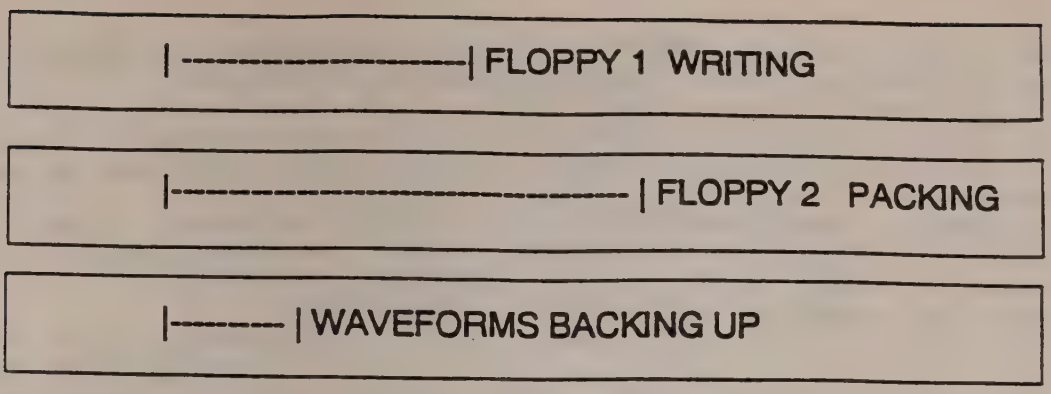


Figure 1-5. Progress Display

The length of each line represents the amount of data being processed (approximately 750 thousand characters in the case of the floppy disks). As data are written, line length increases; as data are read, line length decreases.

The first two lines of the progress display indicate the status of the current floppy disk and the next one. The third line indicates the status of the hard disk drive. Its length indicates the amount of data to be processed. during a back up operation, this line represents the sum of the areas selected. During a restore operation, this line represents the amount of data to be read from floppy disks to restore the selected areas

During a backup operation, the floppy drive is in five states:

PACKING	Hard disk drive data being compressed for writing to floppy disk
IDLE	Program waiting for previous write operation to finish
WAITING	Program waiting for insertion of next floppy disk
FORMATTING	Floppy disk being prepared for writing
WRITING	Hard disk drive data being transferred to floppy disk
DONE	Operation complete

During a restore operation, the floppy drive also is in five states:

WAITING	Program waiting for insertion of next disk
READING	Floppy disk data being transferred to hard disk drive
UNPACKING	Floppy disk data being decompressed for writing to hard disk drive
IDLE	Program waiting for previous UNPACKING operation to finish
DONE	Operation complete

The hard disk drive can be in three states:

BACKING UP	Transferring data from hard disk drive to floppy disk
RESTORING	Transferring data from floppy disk to hard disk drive
SKIPPING	Reading floppy disk data but not transferring to hard disk drive

1-9 Hard (Physical) Formatting of Hard Disk

To perform hard (physical) formatting of the hard disk drive, use the following procedure:

a. Press Install softkey. Installation utility screen (see figure 1-2) will be displayed.

NOTE

Physical formatting of the hard disk drive erases all files. Be sure to back up all files (panel settings and RCL programs) before physically formatting the hard disk drive.

b. Press Format softkey. Yes and No softkeys and All data on the hard disk will be erased!!! Are you sure you want to do this? message displayed.

c. Press **No** softkey to stop formatting and return to installation utility screen. Press **Yes** softkey to continue. **This is your last chance!!! Press Yes or No** message displayed. Press **No** softkey to return to installation utility screen. Press **Yes** softkey to begin formatting hard disk drive. **Performing physical (hard) format of hard disk...** message displayed. When formatting complete, install procedure performed automatically. While software is being loaded, **Installing** message will be displayed.

d. If user partition (area where panel files and RCL programs stored) to be modified, **Partition USER exists, do you want to erase all old files?** message displayed along with **Yes** and **No** softkeys. Press **Yes** softkey to erase all old files, including panel setup and RCL programs. Press **No** softkey to keep old files on hard disk drive. Any files with same filename as new files will be overwritten. **Installing...** message displayed again, followed by **Please insert disk 2** message when installation complete.

e. Insert disk 2 and installation will continue automatically.

f. Repeat step d. to load software from additional disks. When all new software loaded, **Remove floppy disk and press Return key to return to main screen** message displayed.

g. Remove last floppy disk and press Return softkey. System utilities main screen will be displayed.

1-10 Power Information

The 7200 Mainframe is designed for dual-voltage operation. To satisfy both North American and European regulatory requirements, the 7200 Mainframe is shipped from the factory with the fuse drawer (figure 1-6) and fuses for its intended destination installed and the alternate fuse drawer and fuses packed as spares.

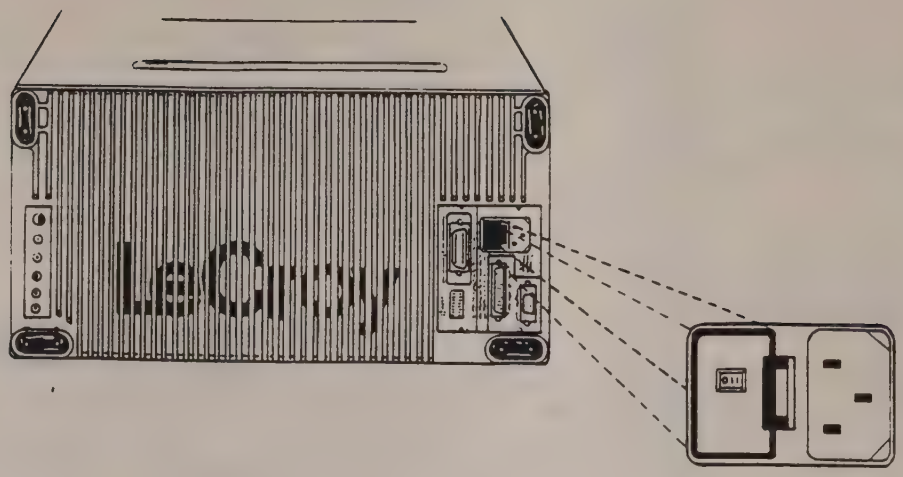


Figure 1-6. Fuse Drawer

The two fuse drawers are color coded.

Color Code	Fuse Type	Dimensions	Line Voltage	Frequency	Amps	Fuse Volts
Gray	3AG	1/4" x 1-1/4"	90-125	47-63 Hz	12	250
Black	IEC 127	5mm x 20mm	180-250	47-63 Hz	6.3	250

To verify the fuse type, number installed, and condition, use the following procedure:

a. At back panel interface on Rear of 7200 Mainframe, check window of fuse drawer for display of appropriate voltage (110 or 220).

WARNING

To prevent an electric shock hazard, the line cord should be removed from the AC power outlet before the fuse drawer is removed.

b. **To change line voltage selection, insert tip of flat head screwdriver under lip of plastic tab on right side of drawer and lift tab up to release drawer.**

c. **Change voltage setting by removing insert (figure 1-7) and rotating to display desired value in window, then reinstall insert and snap into place.**

d. **Reinstall fuse drawer in back panel interface.**

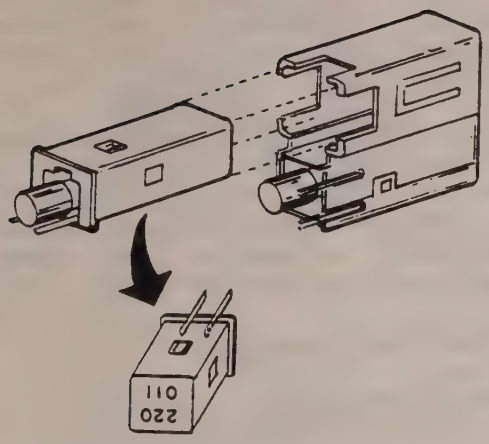


Figure 1-7. Line Voltage Selection

1-11 Power Cord Information

The type CEE-22 AC input receptacle in the back panel interface assembly (see figure 1-6) has three recessed male pins which mate with the detachable line cord. The 7200 Mainframe is shipped to its original intended destination with the appropriate line cord. Other types of line cord are available from LeCroy.

1-12 Memory Backup Power

The 7200 Mainframe is equipped with a 3.9-volt Lithium battery which is used to retain memory in the event of a power interruption.

1-13 Operating Environment

1-13.1 Normal Temperature Range

The 7200 Mainframe may be operated in ambient air temperatures ranging from 0° to +40°C. Storage temperatures may range from -40°C to +75°C.

1-13.2 Ventilation Requirements

Air drawn in through the bottom front of the 7200 Mainframe is exhausted through fins in the rear heatsink assembly. Proper air flow through the interior requires placement on a hard, flat surface or carpeting with a low nap.

At least a half-inch of clearance must be provided under the bottom, behind the rear fins of the heatsink, and along the left and right sides for convection cooling. The rubber feet mounted on the bottom cover provide sufficient clearance for ventilation with the 7200 Mainframe resting on them.

1-14 Packing for Shipment

If it is necessary to return a 7200 Mainframe to LeCroy, use the following procedure:

a. Prepare a tag with the following information:

   (1) The purchase order number

   (2) The company name (or your name, if you are an individual owner) and complete name and address

   (3) A description of the problem(s) that make factory service necessary

   (4) The name and telephone number of the person to contact for confirmation

b. Place tagged 7200 Mainframe in original packaging, if available, as shown in figure 1-8.

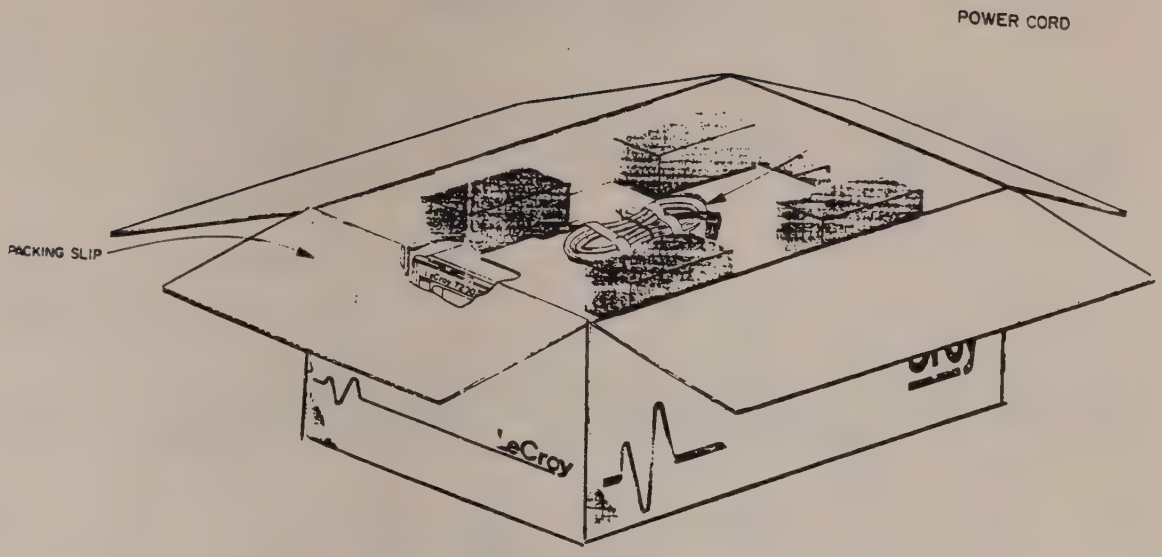


Figure 1-8. Return Shipment Packaging

SECTION 2 TESTS

2-1 Introduction

Functionality of the 7200 Mainframe may be checked by performing a self-test and a front panel button and knob test. A system test can be performed to isolate defective assemblies.

2-2 Self-Test

2-2.1 Introduction

The purpose of self-testing is to evaluate internal circuitry. Eight tests are performed. Each test is applied to specific circuitry as follows:

1 - CPU Test
- All devices for functionality
- All BRAM, DRAM, shadow RAM and MNX memory
- Local data and adress buffers
- VME data and address buffers
- All interrupts

2 - VME Data and Address Line Test (Display blanked)
- PCON local data an address lines
- PCON local memory
- PCON local registers

3 - SCLK Test
- Board presence
- Control register

4 - Display Test (Display blanked)
- Memory, data, and address lines
- Front panel registers

5 - MDBP Data and address line Test (through module memory test)

6 - PCON-CPU Arbitration and Interrupt Test

7 - TMS0 and TMS1 to CPU Interrupt Test

8 - PCON to DRAM Memory Test

Test software is furnished on 3-1/2 inch disks. The correct disk to use is determined by the type of CPU board installed inside the 7200 mainframe. To check the type of CPU board installed, use the following procedure:

a. With power off, remove four screws (figure 2-1) from top and remove top cover to gain access to card cage.

b. Check CPU board for CPU or CPUA identification. Refer to appendix B, page B-1 and note that CPUA boards are specifically identified and the two boards differ in component placement.

c. Reinstall top cover by reinstalling four screws.

2-2.2 Test Setup

The appropriate software disk is installed in the floppy disk drive (27, figure A-1) when the test is to be performed. Individual tests are selected by pressing TRACE softkeys on the right side of the display.

2-2.3 Test Procedure

To perform the self-test, use the following procedure:

a. With power off, insert test software disk into floppy disk drive.

b. Turn on power and wait while system self-test performed. When screen displays **System Selftest Passed Test Loaded**, TRACE keys on right of display are programmed for softkey selection of individual tests.

NOTE

Testing can be stopped at any time by pressing Softkey left 10.

c. Press Trace 1 softkey (32, figure A-1) to select CPU Self Test. Testing is automatic. Once testing starts, the TRIGGER MODE LEDs count test numbers in hexadecimal.

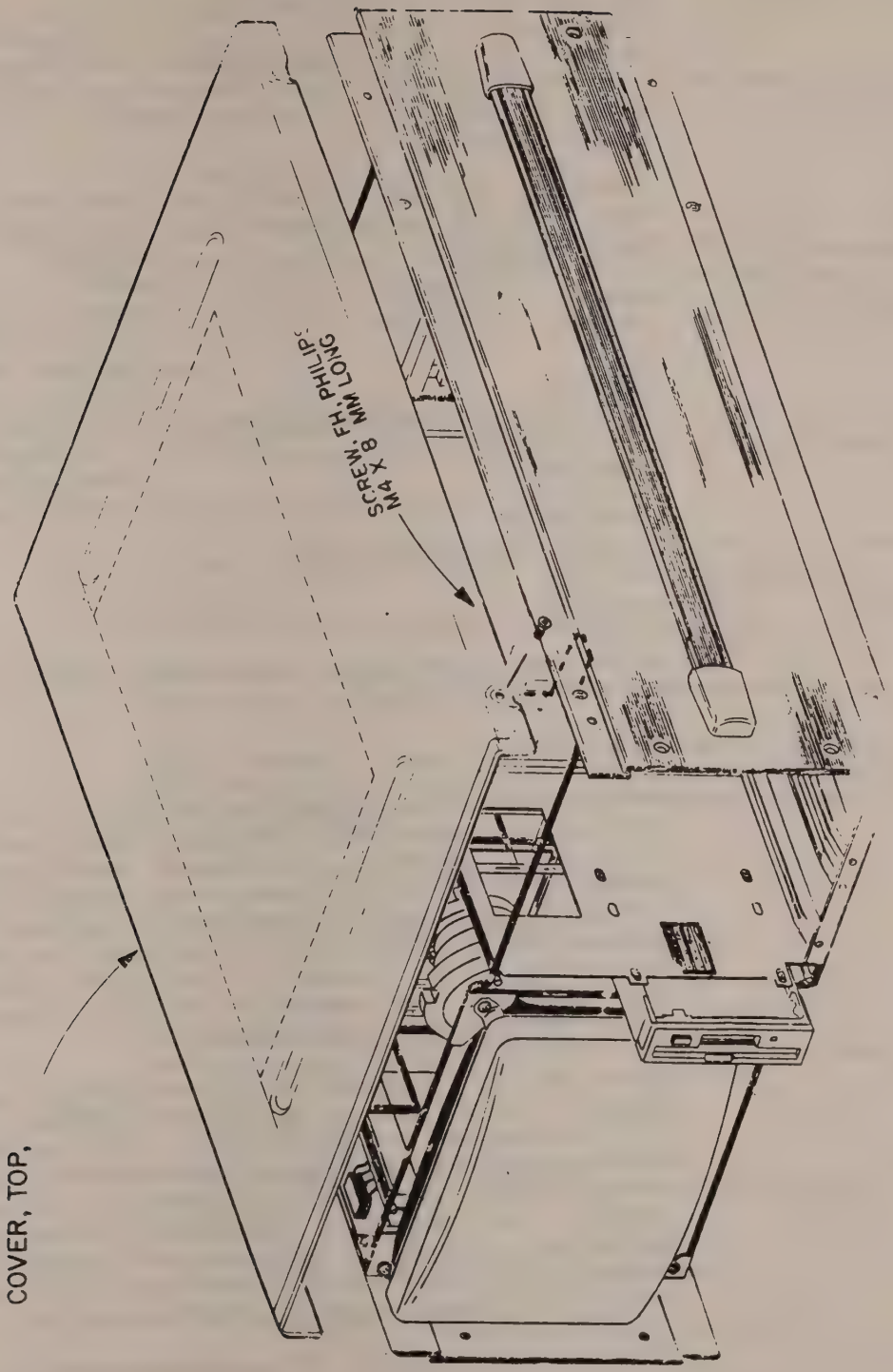


Figure 2-1. Top Cover Removal

If an error is detected, an error message is displayed if test 1, 3, 5, or 6 through 8 is being performed or the TRIGGER MODE LEDs flash if test 2 or 4 is being performed. The program will cause **TEST PASS** or **TEST FAIL** to be displayed at the conclusion of testing.

Problems can be isolated and resolved quickly by interpreting error messages, as follows:

Error Source	Action
CPU(A)	Replace CPU(A)
PCON	Replace PCON
SCLK	Replace SCLK
Display	Replace Display
VME Data and Adress Lines	Check MDBP data and address lines
Hard Disk	Check PCON to hard disk cables

2-3 Front Panel Button/Knob Test

2-3.1 Introduction

The purpose of front panel button and knob testing is to check their operation.

2-3.2 Test Procedure

a. Press TRACE 3 softkey (34, figure A-1). Press all buttons on front panel except softkey left 10 (10), unless a softkey is tested and found to be inoperative in which case press softkey left 10 to continue testing. If no defective buttons are found, press softkey left 10 to terminate the test. Refer to section 5 for removal of the front panel assembly and section 6 for removal of the front panel circuit board assembly and softkeys.

b. Press TRACE 7 softkey (38). Turn knob identified on display (Vertical or Horizontal EXPAND) until all "-" characters replaced with "x" characters. If associated POSITION control (Vertical or Horizontal) changes position, or is disturbed during testing, letter A or letter B displayed indicating repair necessary. Refer to section 5 for removal of the front panel assembly and section 6 for removal of the front panel circuit board assembly.

c. Press Return softkey if pot not working.

d. Press TRACE 8 softkey (39). Rotate Horizontal POSITION knob (23) from stop to stop.

e. Rotate Vertical POSITION knob (20) from stop to stop.

f. Rotate Move Cursor knob (17) from stop to stop.

2-4 System Test

2-4.1 Introduction

Additional tests may be performed to test subassemblies in plug-in modules. Software is installed in the same manner as system software; however, a dongle must be installed in the Centronics port to access files.

2-4.2 Test Setup

a. Insert ATE install disk 1 (of 3) into floppy drive (27, figure A-1).

b. Apply power to 7200 Mainframe.

c. Press Install softkey, then Start softkey.

d. Follow screen prompts for disks 2 and 3.

e. Turn off 7200 Mainframe and connect onge to Centronics port.

f. Apply power to 7200 Mainframe again and press MODIFY softkey (24), Interleaved Sampling softkey, and Return softkey.

g. Press Configure System softkey (7).

h. Press System Test softkey.

NOTE

If **CANNOT READ DIRECTORY** error message is displayed, repeat steps a. through h.

2-4.3 Test Procedure

a. Press Disk Drive softkey to select disk drive INTERNAL.

b. Select **MAIN** to test 7200 Mainframe.

c. Select appropriate subassembly to test.

d. Select test to run.

e. Select plug-in (MAINFRAME)

f. Select interactive = YES

g. Select iterations = 1

h. Select reset module = YES

i. Select AUX 1-5 = 0

j. Press EXECUTE. If all tests are completed successfully, a **TEST PASSED** message will be displayed; otherwise the program will stop and loop when it encounters an error.

SECTION 3 TROUBLESHOOTING

Testing of the 7200 Mainframe may reveal problems which require additional troubleshooting to isolate. This section of the service manual lists 13 possible symptoms, describes them, identifies possible faults, and provides step-by step procedures, many with accompanying diagnostic flow diagrams, for repair. The 13 symptoms are:

Paragraph	Symptom
3-1	BRAM Invalid
3-2	Bus Errors
3-3	Centronics Port Problems
3-4	Fatal PCON Errors
3-5	Floppy Diskette Change Not Detected
3-6	Floppy Drive Read/Write Problems
3-7	GPIB Port Problems
3-8	Loops On Initialization (Mainframe Related)
3-9	Loops On Initialization (Plug-In Related)
3-10	Mainframe Power Failure
3-11	No Display
3-12	RS-232 Port Does Not Work
3-13	System Asking for Configuration or Test Disk

Some troubleshooting procedures require replacement of a board or boards to correct performance problems. It is absolutely necessary to replace boards with equivalent or higher revisions, they are never backwardly compatible. In the case of the 7200 Mainframe, the CPU board may be replaced with another CPU board or a CPUA board. In addition, a board removed during troubleshooting should not be replaced with one having a lower engineering change order (ECO) level, e.g., a board with a level 1003 sticker should not be replaced with a board bearing a level 1001 sticker.

3-1 SYMPTOM: BRAM INVALID

DESCRIPTION:

BRAM INVALID error message displayed as 7200 Mainframe powered up

POSSIBLE FAULTS:

1. Battery low or dead
2. Blown fuse on CPU(A) board
3. CPU(A) board not installed

REPAIR STEPS:

a. If CPU(A) board has ever been removed, BRAM has been invalidated. To validate BRAM, insert install disk 1 in floppy drive. Apply power to 7200 Mainframe and allow to boot from install disk #1 floppy disk. After BRAM has been validated, remove install disk #1 and reapply power to 7200 Mainframe, allowing normal boot-up from hard disk. If problem not corrected, go to step b.

b. Determine whether CPU or CPUA is installed in 7200 Mainframe (see paragraph 2-2.1). Go to step c.

c. Measure battery voltage. For CPU, measure at pin 15 of P3; for CPUA, measure at location A8, pin 28. If voltage 3 volts or more, replace CPU(A) board (see section 5 for removal, section 8 for installation of replacement). If voltage 0, replace fuse F2 on CPU(A) board. If voltage more than 0 but less than 3 volts, replace battery (see section 5 for removal, section 8 for installation of replacement)

d. Repeat step a. If problem remains, consult factory.

e. Repeat self-test (section 2, paragraph 2-2)

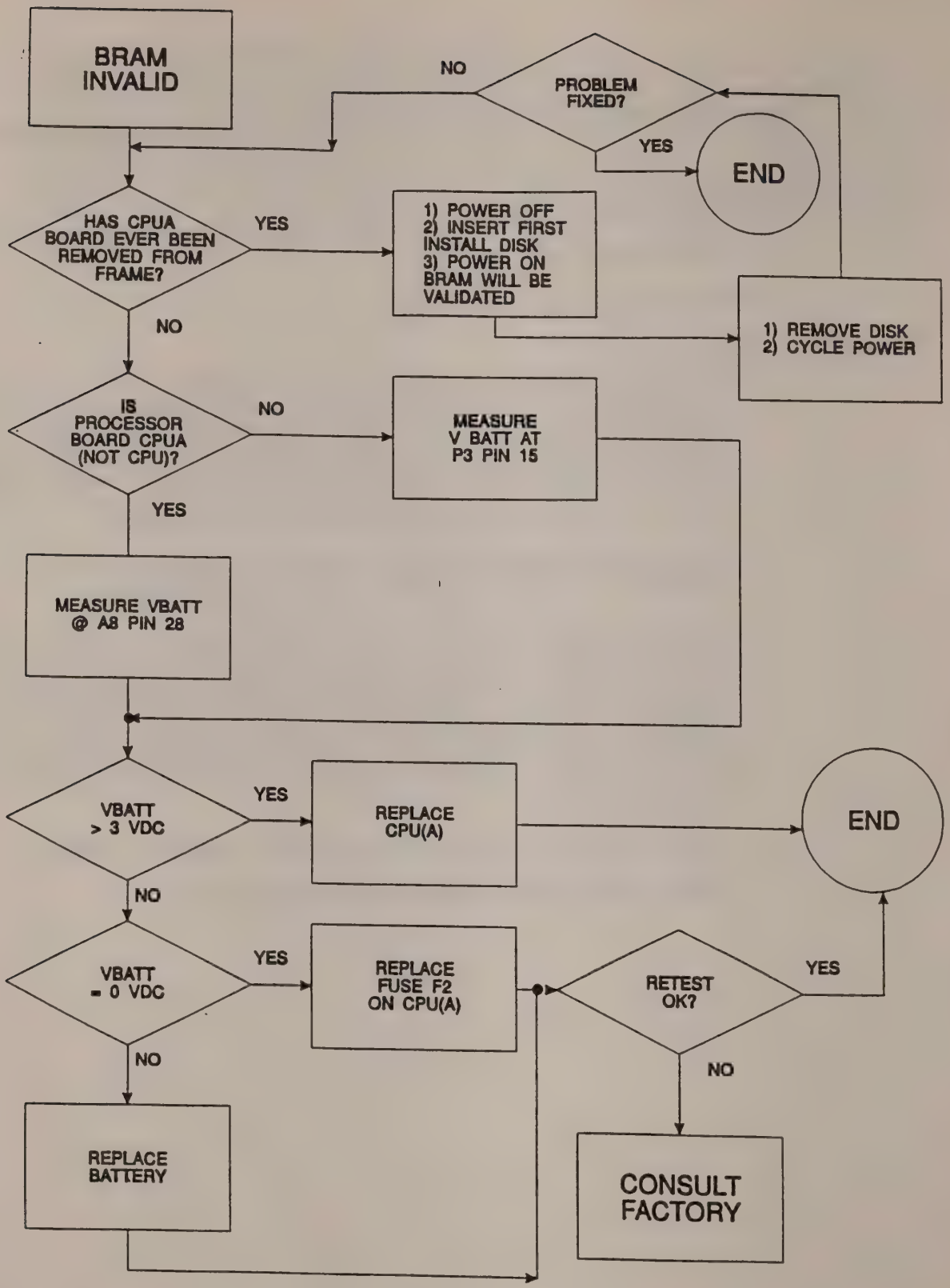


Figure 3-1. BRAM Invalid Flow Diagram

3-2 SYMPTOM: BUS ERRORS

DESCRIPTION:

When bus error occurs, 7200 Mainframe may either hang up or beep and reset. When 7200 Mainframe reinitialized after bus error has occurred, **INTERNAL SYSTEM FAULT OCCURRED** message displayed. Initialization may halt and display system fault menu or reboot normally and enter bus error in system log.

NOTE

Bus errors that occur infrequently (once a day or less) indicate a low-level system problem which may be very difficult to isolate. If errors occur infrequently, consult the factory.

POSSIBLE FAULTS:

1. Plug-in "A"
2. Plug-in "B"
3. Defective CPU(A) board
4. Defective SCLK board
5. Defective DSPL board
6. Defective PCON board
7. Defective floppy drive
8. Defective hard disk drive
9. Defective I/O ports

REPAIR STEPS:

a. Reformat hard drive and reinstall operating system. If problem remains, go to step 2.

b. Record DCFA address from bus error. Using first two or three characters from DCFA address, determine which subassembly is defective.

Address Start	Defective Assembly
08	Plug-In slot "A"
09	Plug-In slot "B"
00	CPU(A)
01	CPU(A)
FFF	SCLK
FE	DSPL
FF9	PCON

See section 5 for removal of defective boards, section 8 for installation of replacements.

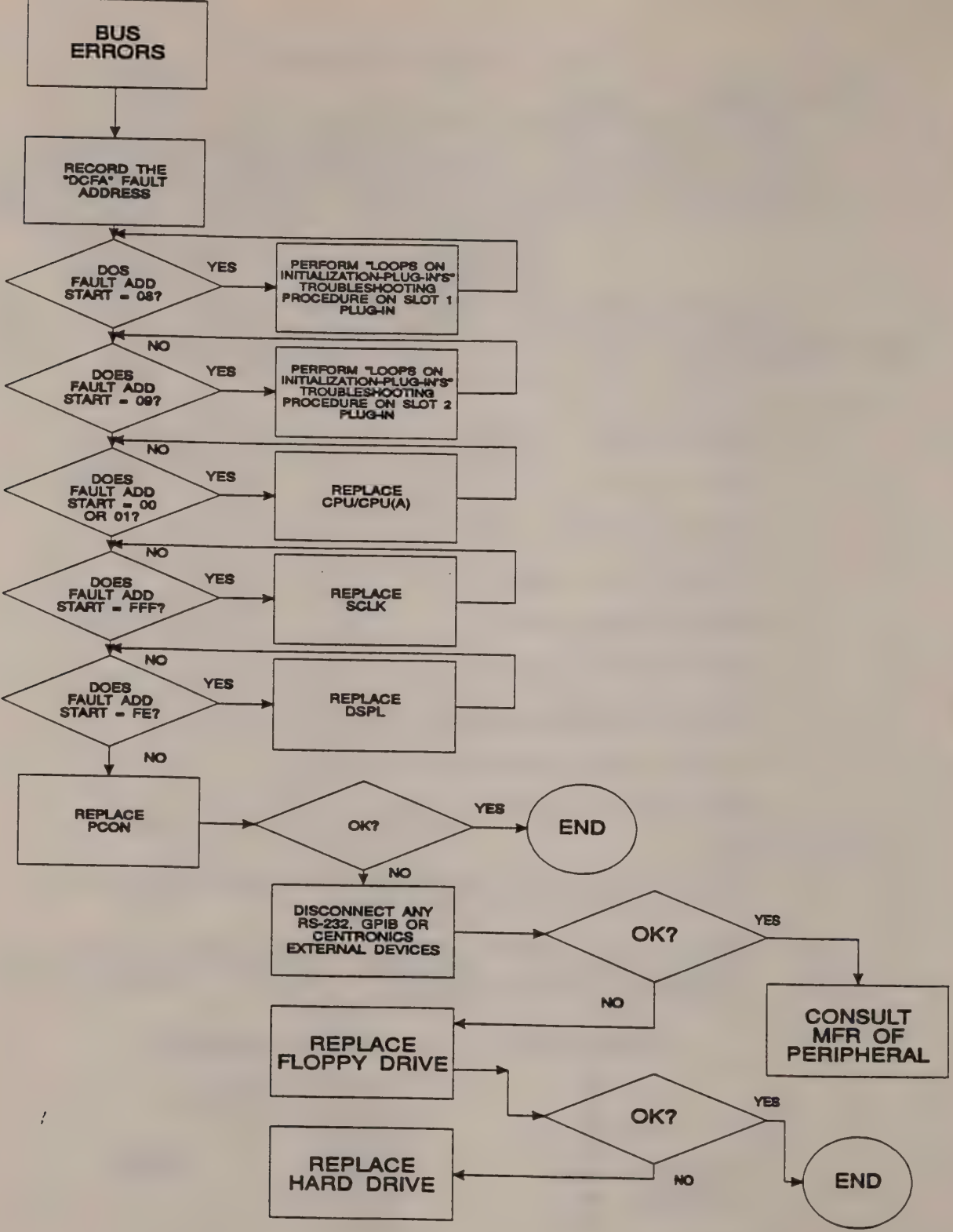


Figure 3-2. Bus Errors Flow Diagram

c. If bus error PCON related, and changing PCON board does not fix problem, disconnect all external devices connected to RS-232, Centronics, and GPIB ports. If problem corrected, consult with manufacturer of peripheral device; if not, go to step d.

d. Replace floppy drive (see chapter 5 for removal, chapter 8 for installation of replacement). If problem not corrected, consult factory.

3-3 SYMPTOM: CENTRONICS PORT PROBLEMS

DESCRIPTION:

No output or garbled output to printer or plotter

POSSIBLE FAULTS:

1. Centronics port not configured in accordance with hardcopy setup menu

2. Cable between Centronics port and printer/plotter defective

3. Cable from MFBP to rear panel interface disconnected or misaligned (see figures C-1 and C-2)

REPAIR STEPS:

a. Determine whether Centronics port properly selected and configured through use of hardcopy setup menu.

b. Confirm that device selected from menu is compatible with printer or plotter connected to port.

c. Refer to printer/plotter users' manual to determine compatibility with devices listed in hardcopy setup menu.

d. Examine cable J103 which connects MFBP to rear panel interface (see figures C-1 and C-2). Reconnect or replace cable, if necessary.

e. Verify that IC U12 on PCON board (see figure B-5) is properly seated.

f. Replace PCON board (see chapter 5 for removal, chapter 8 for installation of replacement)

NOTE

Verify that jumpers P7 an P201 are properly positioned on the replacement PCON board for the existing floppy drive in the 7200 Mainframe (see figure B-5).

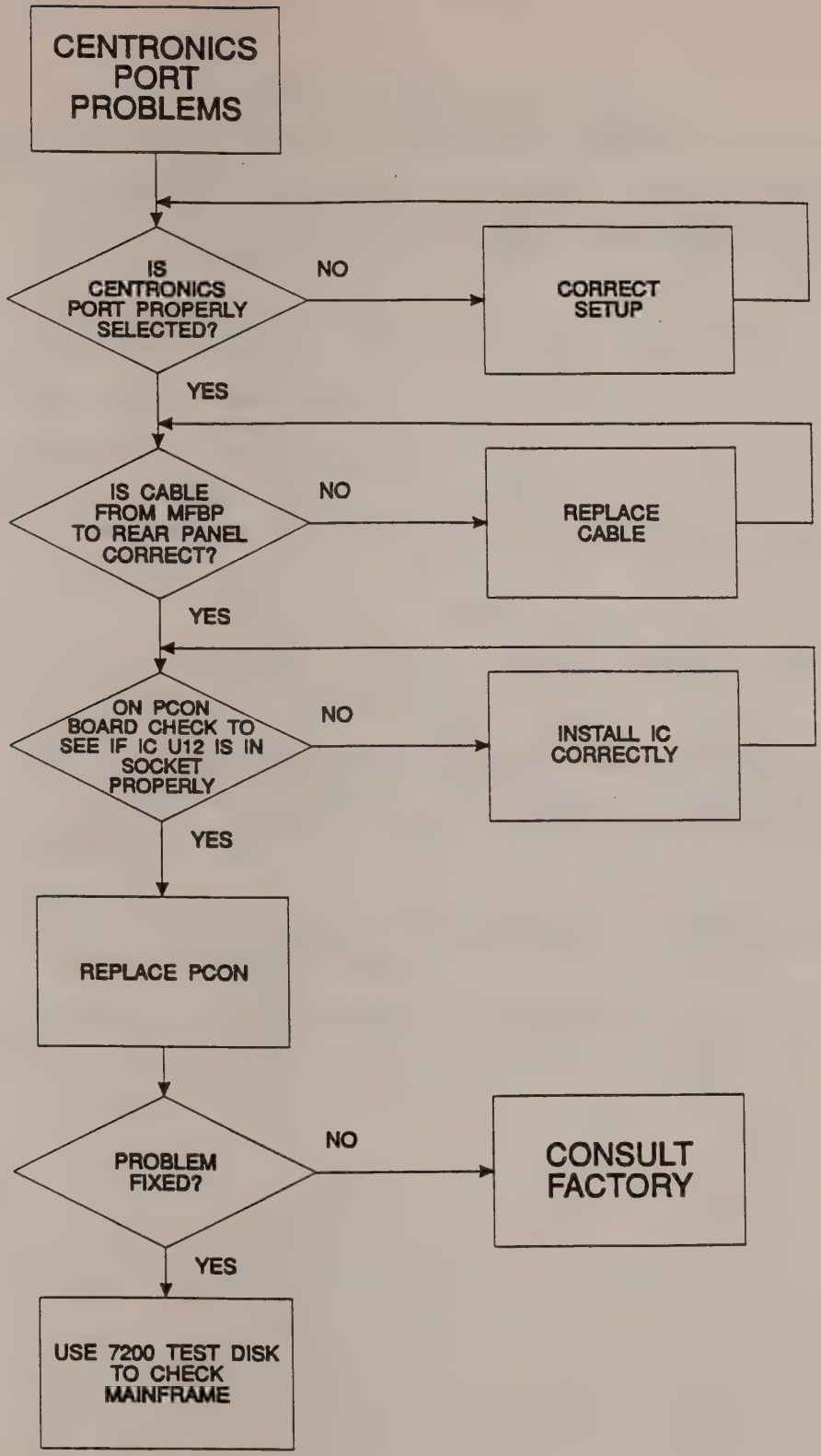


Figure 3-3. Centronics Port Problems Flow Diagram

g. Repeat self-test (section 2, paragraph 2-2)

3-4 SYMPTOM: FATAL PCON ERRORS

DESCRIPTION:

Accessing of PCON-driven device(s) (floppy drive, hard disk drive, RS-232 port, GPIB port, or Centronics port) fails or is aborted. **FATAL PCON ERROR** message entered into system log.

POSSIBLE FAULTS:

1. Improper seating of CPU(A) or PCON boards
2. Defective PCON board
3. Defective CPU(A) board

REPAIR STEPS:

a. Reseat CPU(A) and PCON boards. If problem resolved, go to step d.

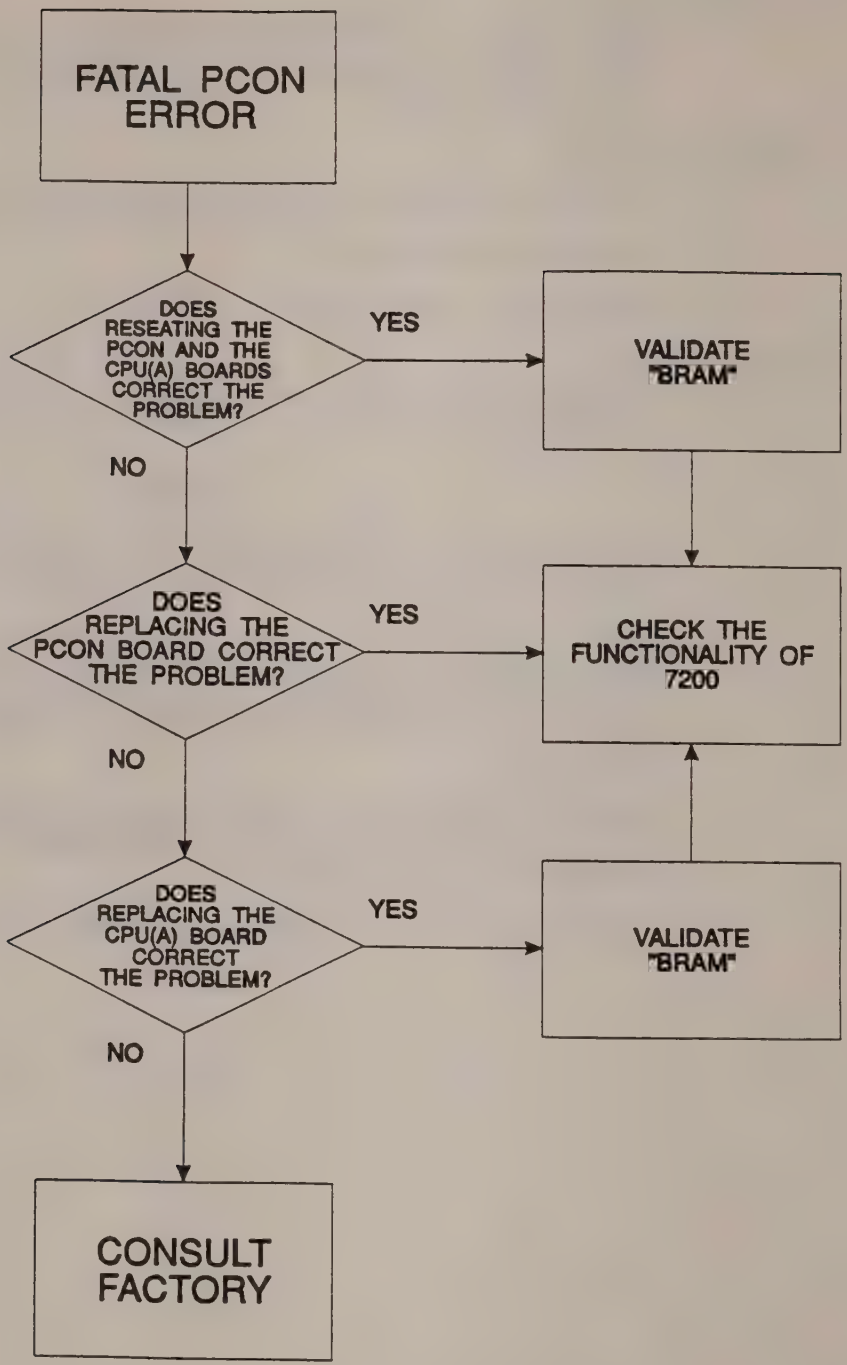
NOTE

Reseating the CPU(A) board will invalidate the BRAM. See paragraph 3-1 for corrective action.

b. Replace PCON board (see chapter 5 for removal, chapter 8 for installation of replacement). Verify that jumpers P7 an P201 are properly positioned on replacement PCON board for existing floppy drive in 7200 Mainframe (see figure B-5).

c. Replace CPU(A) board (see chapter 5 for removal, chapter 8 for installation of replacement). If problem not resolved, consult factory.

d. Repeat self-test (section 2, paragraph 2-2)



3-4. Fatal PCON Errors Flow Diagram

3-5 SYMPTOM: FLOPPY DISKETTE CHANGE NOT DETECTED

DESCRIPTION:

System appears to access floppy disk files correctly when first diskette installed in floppy drive, but does not update filename directory when **Read New Floppy Disk** softkey pressed with disk utilities menu displayed.

Also may occur when upgrading or installing new system software. 7200 Mainframe boots installation diskette #1 normally but not installation diskette #2.

POSSIBLE FAULTS:

1. Cable JF34 damaged or defective
2. Jumper missing from Fujitsu floppy drive
3. PCON board defective

REPAIR STEPS:

a. Inspect cable JF34. Be sure it is well seated in connector. If problem not solved, replace cable

b. Determine whether floppy drive made by Fujitsu. If so, check for jumper across JP5 as shown in figure 3-5; otherwise, go to step c.

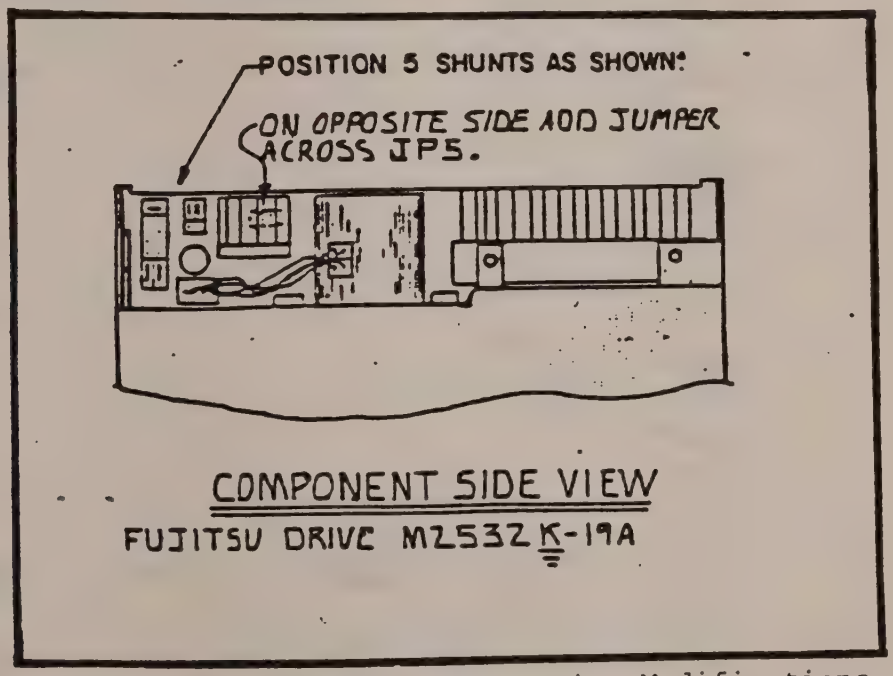


Figure 3-5. Fujitsu Floppy Drive Modifications

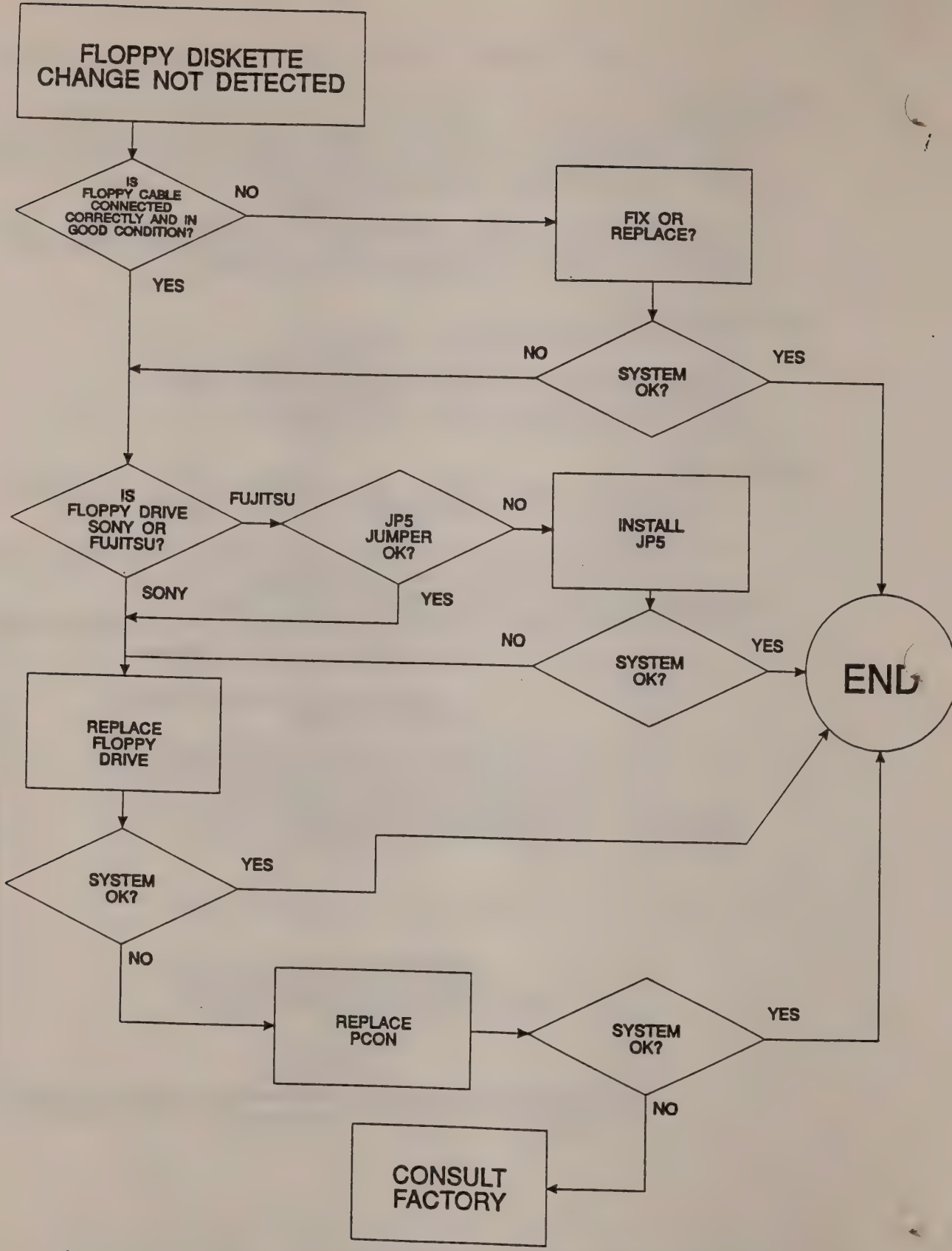


Figure 3-6. Floppy Diskette Change Not Detected Flow Diagram

c. Replace floppy drive (see chapter 5 for removal, chapter 8 for installation of replacement). To save time, disconnect floppy drive data cable (JF34) and power cable (JF4) (see figures C-1 and C-2 for location) and temporarily install known-good floppy drive externally. If replacing Fujitsu floppy drive with Sony, be sure to reconfigure jumpers P7 and P201 on PCON (see figure B-5). If temporary replacement solves problem, install new floppy drive (see section 8 for procedure); if not, go to step d.

d. Replace PCON board (see chapter 5 for removal, chapter 8 for installation of replacement). Be sure to configure jumpers on replacement PCON board to match floppy drive installed in 7200 Mainframe.

e. Repeat self-test (section 2, paragraph 2-2)

3-6 SYMPTOM: FLOPPY DRIVE READ/WRITE PROBLEMS

DESCRIPTION:

CAN'T MOUNT FLOPPY message displayed or system error occurs when floppy drive reading or writing files (panel setups, programs, or waveforms)

POSSIBLE FAULTS:

1. Incorrectly formatted or defective diskette
2. Defective or misaligned floppy drive data cable
3. Defective floppy drive
4. Defective PCON board

REPAIR STEPS:

a. Eliminate diskette as source of problem by installing new 3-1\2 in DS/DD diskette and using 7200 disk utilities to format. Exercise read/write functions to determine whether problem still exists

b. Refer to figure 3-7. Inspect data cable (J21-JF34) between PCON board and floppy drive to be sure it is in good condition and properly connected. Reconnect, repair, or replace cable as necessary

c. Inspect power cable (PHD-P42) between floppy drive and DC/DC board to be sure it is in good condition and properly connected. Reconnect, repair, or replace cable as necessary

d. Replace floppy drive (see chapter 5 for removal, chapter 8 for installation of replacement). Be sure that replacement floppy drive is properly configured for PCON board installed in 7200 Mainframe

e. Replace PCON board (see chapter 5 for removal, chapter 8 for installation of replacement). Be sure to configure jumpers on replacement PCON board to match existing or replacement floppy drive installed in 7200 Mainframe.

f. Repeat self-test (section 2, paragraph 2-2)

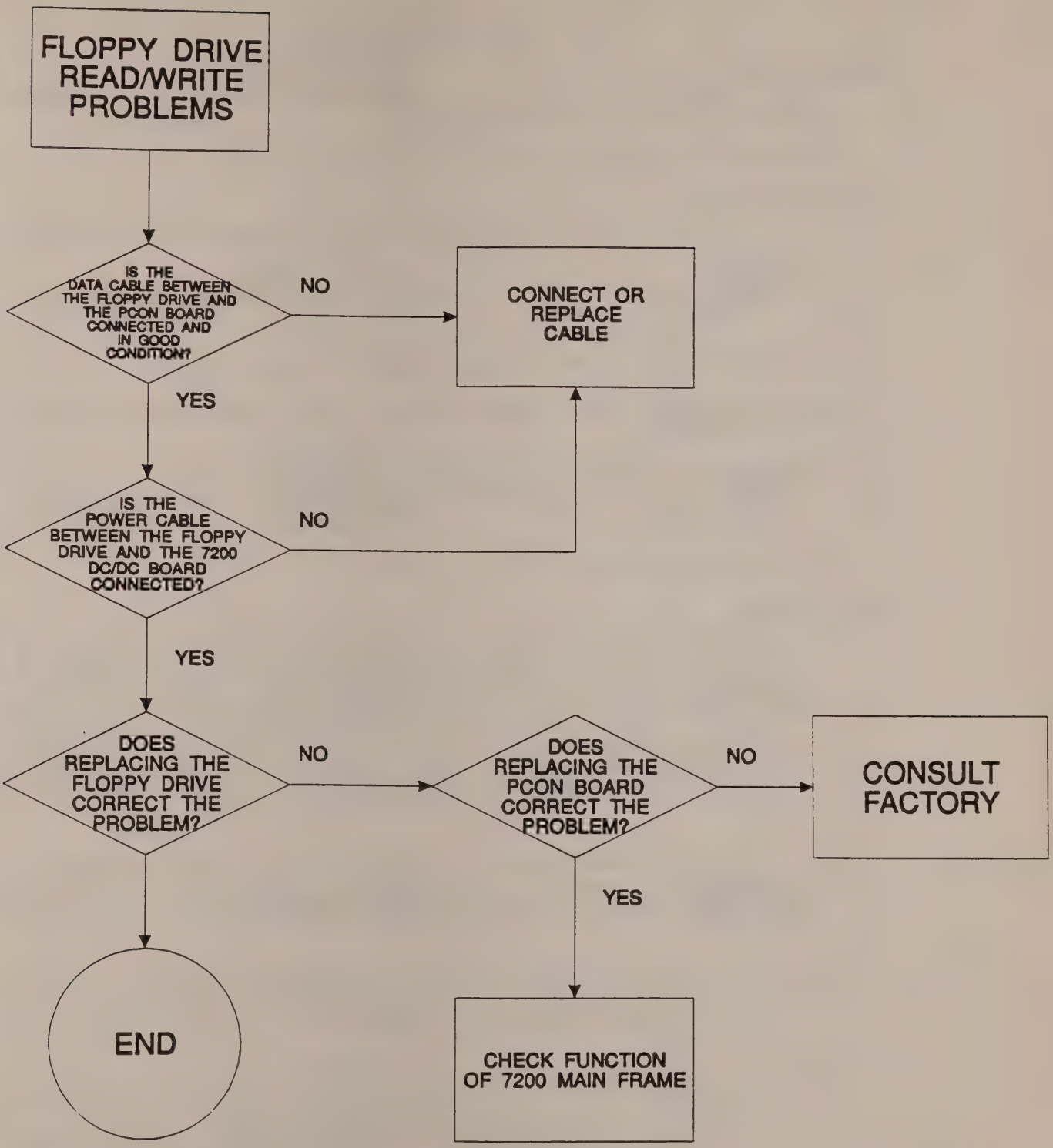

FLOPPY DRIVE READ/WRITE PROBLEMS
IS THE DATA CABLE BETWEEN THE FLOPPY DRIVE AND THE PCON BOARD CONNECTED AND IN GOOD CONDITION?
NO
CONNECT OR REPLACE CABLE
YES
IS THE POWER CABLE BETWEEN THE FLOPPY DRIVE AND THE 7200 DC/DC BOARD CONNECTED?
NO
YES
DOES REPLACING THE FLOPPY DRIVE CORRECT THE PROBLEM?
NO
DOES REPLACING THE PCON BOARD CORRECT THE PROBLEM?
NO
CONSULT FACTORY
YES
END
CHECK FUNCTION OF 7200 MAIN FRAME

Figure 3-7. Floppy Drive Read/Write Problems Flow Diagram

3-7 GPIB PORT PROBLEMS

DESCRIPTION:

7200 Mainframe does not respond to commands or queries received from remote host device

Plotters or printers do not operate correctly

POSSIBLE FAULTS:

1. GPIB port not selected properly from communication setup menu

2. GPIB mode selected for both communication and hardcopy output

3. Defective or improperly connected GPIB cable

4. Incorrect GPIB address set by 7200 Mainframe or remote devices

5. Cable J24-J144 between PCON board and rear panel interface defective, disconnected, or improperly connected

6. PCON board defective

REPAIR STEPS:

a. Refer to figure 3-8. If problem is remote operation of 7200 over GPIB, connect computer (PC) with GPIB port to GPIB port on rear panel interface of 7200 Mainframe, insert PC utilities diskette into floppy drive of PC and select 7200 talk program to initiate interactive communication. Verify that GPIB address selected for 7200 Mainframe in communication setup menu is same as address 7200 talk program is configured for (default address is 6)

b. If 7200 Mainframe printer/plotter output missing or garbled, verify configuration of GPIB port and printer/plotter from hardcopy setup menu, then go to step e.

c. Send simple query such as grid? from PC to 7200 Mainframe. Response should be character string describing current grid status, such as single, single. If not, go to step d.

d. Refer to communication and hardcopy setup menus to verify that GPIB has not been selected for both functions. If GPIB port configured for hardcopy output and there are no remote control problems, change hardcopy output port. If problem not solved, go to step e.

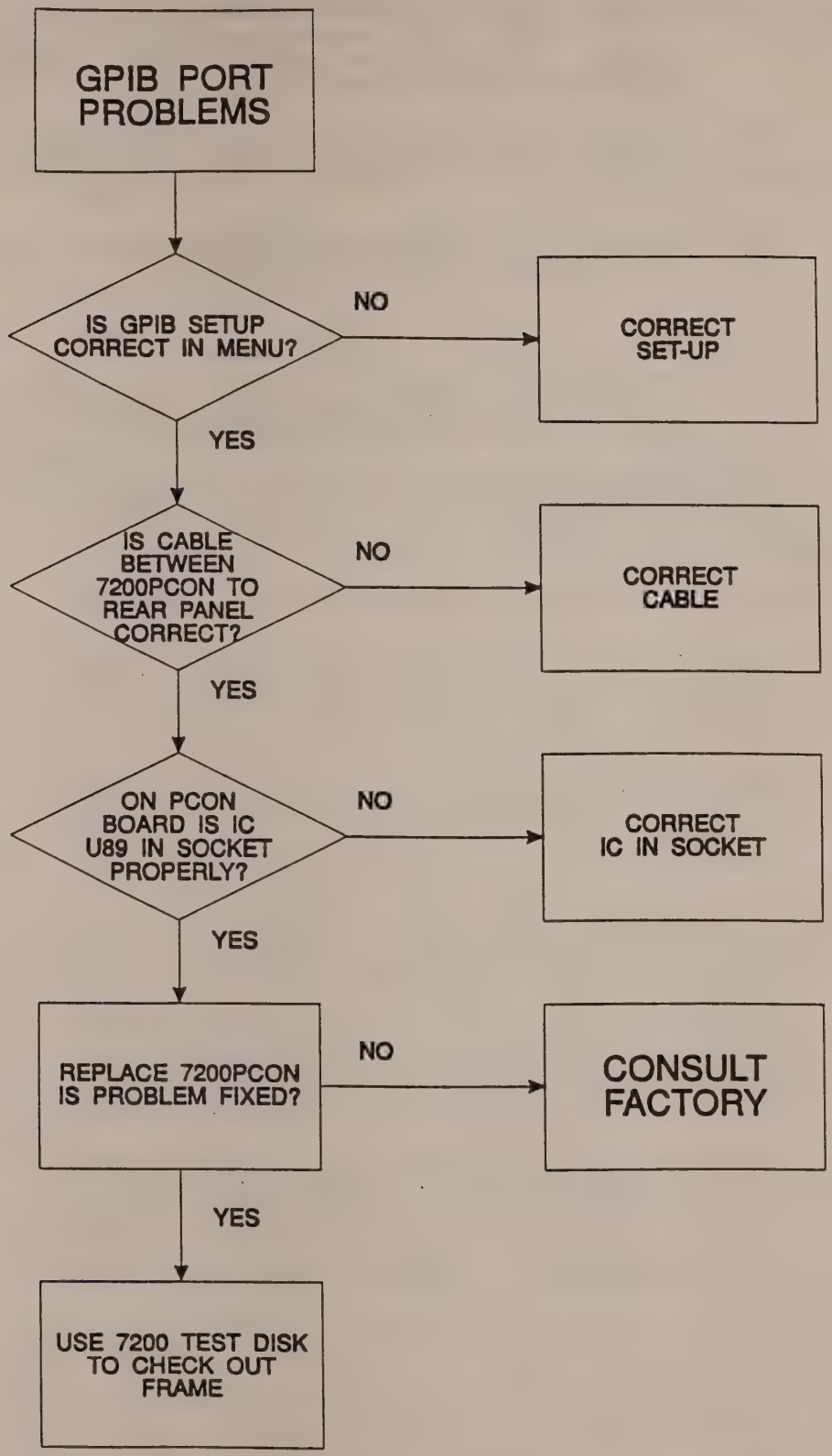


Figure 3-8. GPIB Port Problems Flow Diagram

e. Inspect cable J24-J44 interconnecting PCON board and GPIB port on back panel interface for loose connections and damage. Reconnect or replace cable, if necessary. If problem not solved, go to step e.

f. Inspect seating of IC U89 on PCON board (figure B-5). Reseat U89, if necessary. If problem not solved, go to step g.

g. Replace PCON board (see section 5 for removal, section 8 for installation of replacement)

NOTE

Verify that jumpers P7 an P201 are properly positioned on the replacement PCON board for the existing floppy drive in the 7200 Mainframe (see figure B-5).

h. Repeat self-test (section 2, paragraph 2-2)

3-8 SYMPTOM: LOOPS ON INITIALIZATION (MAINFRAME RELATED)

DESCRIPTION:

System resets and reinitializes continuously

POSSIBLE FAULTS:

1. CPU(A), DSPL, PCON, and/or SCLK boards loose in edge connectors
2. Defective CPU(A) board
3. Defective PCON board
4. Defective DSPL board
5. Defective SCLK board

REPAIR STEPS:

a. Refer to figure 3-9. Remove any plug-in modules installed in 7200 Mainframe and verify that looping during initialization continues. If not, refer to symptom 3-9

b. Reseat all boards in MFBP. If problem solved, go to step g.

c. Replace CPU(A) board (see section 5 for removal, section 8 for installation of replacement). If problem solved, go to step g.

d. Replace PCON board (see section 5 for removal, section 8 for installation of replacement)

NOTE

Verify that jumpers P7 an P201 are properly positioned on the replacement PCON board for the existing floppy drive in the 7200 Mainframe (see figure B-5).

e. Replace DSPL board (see section 5 for removal, section 8 for installation of replacement). Be sure to make display subsystem adjustments described in section 4. If problem solved, go to step g.

f. Replace SCLK board (see section 5 for removal, section 8 for installation of replacement). If problem not solved, consult factory

g. Repeat self-test (section 2, paragraph 2-2)

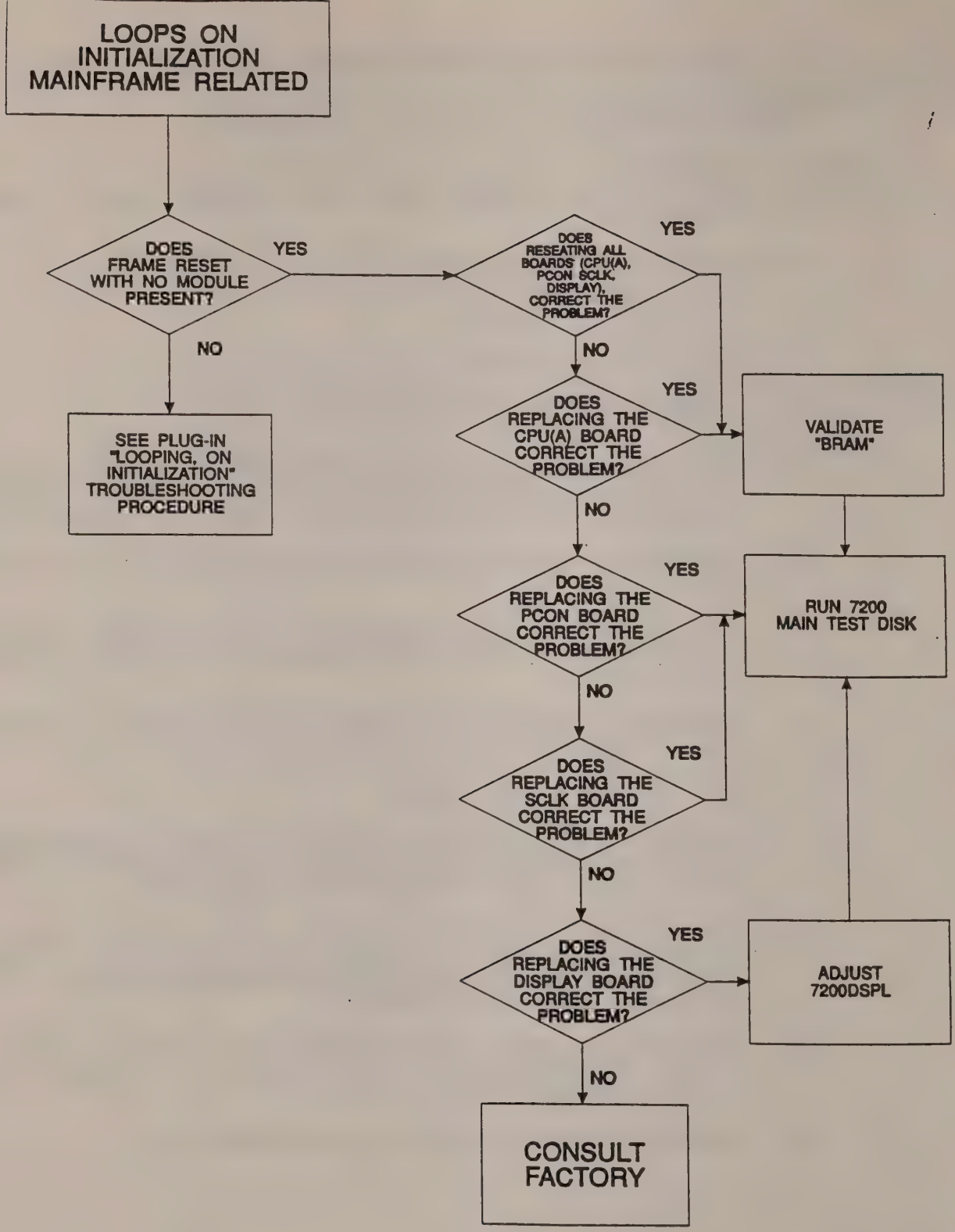


Figure 3-9. Loops on Initialization (Mainframe Related) Flow Diagram

3-9 SYMPTOM: LOOPS ON INITIALIZATION (PLUG-IN RELATED)

DESCRIPTION:

System resets and reinitializes continuously

POSSIBLE FAULTS:

1. CPU(A), DSPL, PCON, and/or SCLK boards loose in edge connectors
2. Defective CPU(A) board
3. Defective PCON board
4. Defective DSPL board
5. Defective SCLK board

REPAIR STEPS:

a. Remove any plug-in modules installed in 7200 Mainframe and verify that looping during initialization stops. If not, refer to symptom 3-8

b. Reseat all boards in MFBP. If problem solved, go to step g.

c. Replace CPU(A) board (see section 5 for removal, section 8 for installation of replacement). If problem solved, go to step g.

d. Replace PCON board (see section 5 for removal, section 8 for installation of replacement)

NOTE

Verify that jumpers P7 an P201 are properly positioned on the replacement PCON board for the existing floppy drive in the 7200 Mainframe (see figure B-5).

e. Replace DSPL board (see section 5 for removal, section 8 for installation of replacement). Be sure to make display subsystem adjustments described in section 4. If problem solved, go to step g.

f. Replace SCLK board (see section 5 for removal, section 8 for installation of replacement). If problem not solved, consult factory

g. Repeat self-test (section 2, paragraph 2-2)

3-10 SYMPTOM: MAINFRAME POWER FAILURE

DESCRIPTION:

No response when **POWER** switch on front panel pressed (no lights, no fan operation)

Pressing **POWER** switch produces "click" at rear of 7200 Mainframe

POSSIBLE FAULTS:

1. Defective main power supply (Rear)
2. Open line fuse
3. Incorrect line voltage selection (110/220)
4. Defective AC power connector
5. Defective or disconnected **POWER** switch on front panel

REPAIR STEPS:

a. Refer to figure 3-10, then refer to paragraph 1-10 and figure 1-5 and verify correct line voltage selected by inspecting fuse drawer window. Change selection, if necessary

b. Verify both fuses in fuse drawer correct type and rating, and not open. If incorrect or open, replace both fuses

c. Inspect block connectors on Rear to be sure of proper connection to MFMD and front panel switch harness (see figures C-1 and C-2)

d. Inspect wires in block connectors for proper crimping (crimped on wires, not insulation). Repair defective crimping.

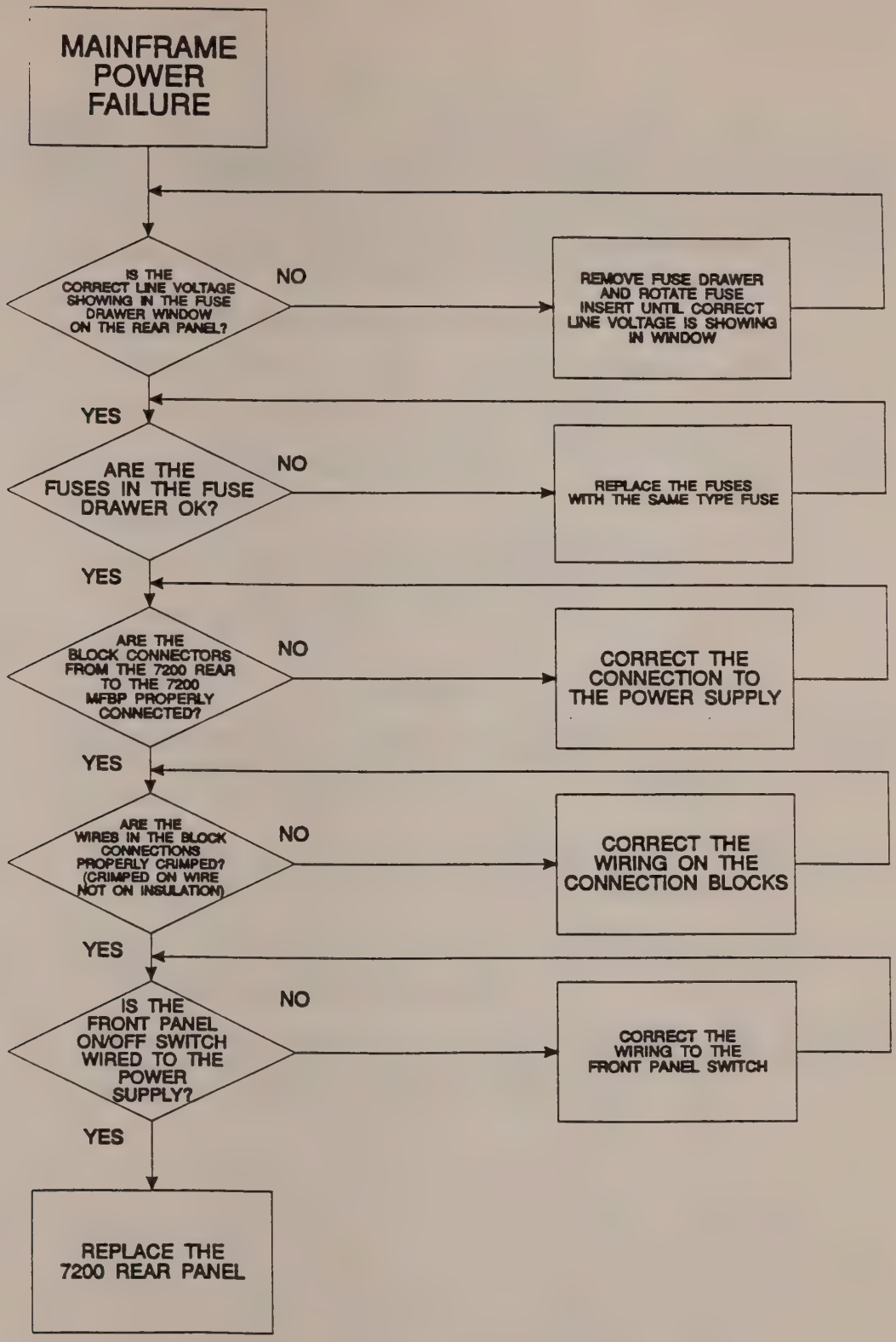

MAINFRAME POWER FAILURE
IS THE CORRECT LINE VOLTAGE SHOWING IN THE FUSE DRAWER WINDOW ON THE REAR PANEL?
NO
REMOVE FUSE DRAWER AND ROTATE FUSE INSERT UNTIL CORRECT LINE VOLTAGE IS SHOWING IN WINDOW
YES
ARE THE FUSES IN THE FUSE DRAWER OK?
NO
REPLACE THE FUSES WITH THE SAME TYPE FUSE
YES
ARE THE BLOCK CONNECTORS FROM THE 7200 REAR TO THE 7200 MFBP PROPERLY CONNECTED?
NO
CORRECT THE CONNECTION TO THE POWER SUPPLY
YES
ARE THE WIRES IN THE BLOCK CONNECTIONS PROPERLY CRIMPED? (CRIMPED ON WIRE NOT ON INSULATION)
NO
CORRECT THE WIRING ON THE CONNECTION BLOCKS
YES
IS THE FRONT PANEL ON/OFF SWITCH WIRED TO THE POWER SUPPLY?
NO
CORRECT THE WIRING TO THE FRONT PANEL SWITCH
YES
REPLACE THE 7200 REAR PANEL

Figure 3-10. Mainframe Power Failure Flow Diagram

e. Verify operation of front panel **POWER** switch and connection of wires from block connectors on Rear. Replace **POWER** switch, if defective. Reconnect wires, if necessary

f. Replace Rear (see section 5 for removal, section 8 for installation of replacement

g. Repeat self-test (section 2, paragraph 2-2)

h. Perform Rear SMA test

3-11 SYMPTOM: NO DISPLAY

DESCRIPTION:

No video displayed on CRT when power applied. If fans operating, TRIGGER MODE LEDs on front panel on, LEDs on plug-in module(s) on, and hard disk drive being accessed, system can be assumed to be operational with exception of display

POSSIBLE FAULTS:

1. Defective DSPL board
2. Defective VAB
3. DSPL board or VAB seating problems
4. Loose or disconnected cable
5. Defective CRT
6. Missing supply voltage(s) (24VDC, 5VDC)
7. Missing power supply line sync

REPAIR STEPS:

WARNING

A danger of exposure to high voltage exists. Refer to section 4 for the proper high voltage discharge procedure to follow before beginning repair.

a. Refer to figure 3-11. Verify +24 VDC present on P43 (red wire). If not, replace Rear (see section 5 for removal, section 8 for installation of replacement)

b. Verify +5 VDC present on P42 (red wire). If not, replace Rear (see section 5 for removal, section 8 for installation of replacement)

c. Check DSPL and VAB for loose, missing, or misaligned cables. Reconnect loose cables. Install replacements for missing cables. Reconnect misaligned cables.

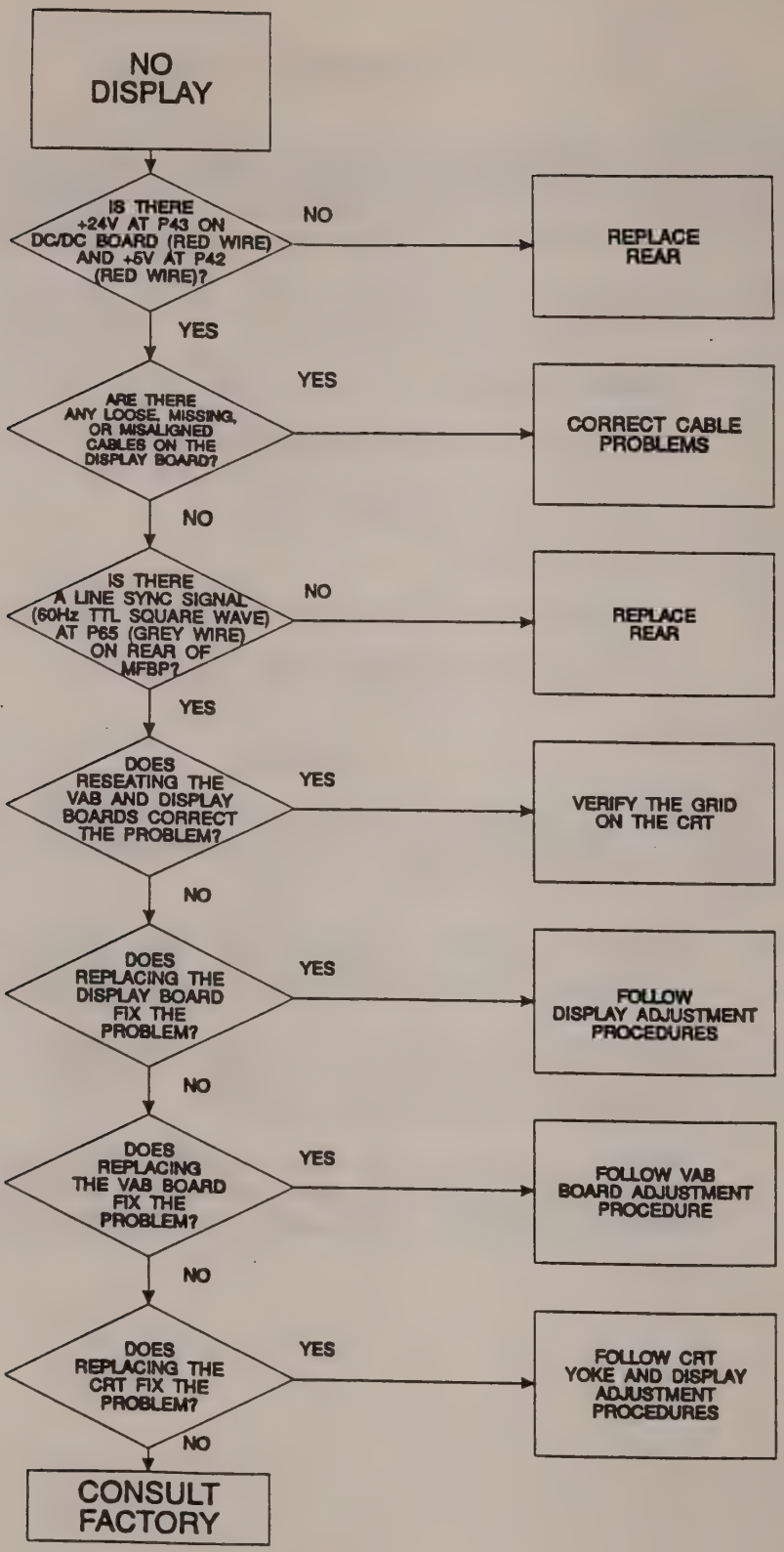

NO DISPLAY
IS THERE +24V AT P43 ON DC/DC BOARD (RED WIRE) AND +5V AT P42 (RED WIRE)?
NO
REPLACE REAR
YES
ARE THERE ANY LOOSE, MISSING, OR MISALIGNED CABLES ON THE DISPLAY BOARD?
YES
CORRECT CABLE PROBLEMS
NO
IS THERE A LINE SYNC SIGNAL (60Hz TTL SQUARE WAVE) AT P65 (GREY WIRE) ON REAR OF MFBP?
NO
REPLACE REAR
YES
DOES RESEATING THE VAB AND DISPLAY BOARDS CORRECT THE PROBLEM?
YES
VERIFY THE GRID ON THE CRT
NO
DOES REPLACING THE DISPLAY BOARD FIX THE PROBLEM?
YES
FOLLOW DISPLAY ADJUSTMENT PROCEDURES
NO
DOES REPLACING THE VAB BOARD FIX THE PROBLEM?
YES
FOLLOW VAB BOARD ADJUSTMENT PROCEDURE
NO
DOES REPLACING THE CRT FIX THE PROBLEM?
YES
FOLLOW CRT YOKE AND DISPLAY ADJUSTMENT PROCEDURES
NO
CONSULT FACTORY

Figure 3-11. No Display Flow Diagram

d. Find P105 (gray wire) on rear of MFBP and verify presence of line sync signal (60 Hz TTL). If absent, replace Rear (see section 5 for removal, section 8 for installation of replacement)

e. Shut down 7200 Mainframe and remove line cord from socket. Discharge CRT by following procedure in section 5

f. Reseat DSPL board and VAB. If problem not solved, go to step g

g. Replace DSPL board (see section 5 for removal, section 8 for installation of replacement). If problem solved, adjust new display subsystem in accordance with procedures in section 4

h. Replace VAB (see section 5 for removal, section 8 for installation of replacement). If problem solved, adjust new display subsystem in accordance with procedures in section 4

i. Replace CRT assembly (see section 5 for removal, section 8 for installation of replacement). If problem solved, adjust new display subsystem in accordance with procedures in section 4, if not solved consult factory

3-12 SYMPTOM: RS-232 PORT DOES NOT WORK

DESCRIPTION:

7200 Mainframe does not respond to commands or queries received from remote host device

Plotters or printers do not operate correctly

POSSIBLE FAULTS:

1. RS-232 port not selected properly from communication setup menu
2. RS-232 cable connected to external device configured incorrectly
3. RS-232 mode selected for both communication and hardcopy output
4. Defective or improperly connected RS-232 cable J143-P103 between MFBP and back panel interface
5. Jumper P12 missing from PCON board, revision C
6. Open signal path on MFBP
7. Defective PCON board

REPAIR STEPS:

a. Refer to figure 3-12. Verify that attributes selected from communication setup menu compatible with external device

b. Verify that remote control and hardcopy output have not been selected concurrently from hardcopy menu. If reselection does not solve problem, go to step d.

c. Verify configuration of RS-232 cable. Repair or replace, if necessary

d. Inspect RS-232 cable J143-P103 for loose connections and damage. Repair or replace, if necessary. If problem solved, go to step e.

e. Refer to figure B-5. Verify shunt in place between pins 1 and 2 of P12. If not, install shunt. If PCON board not revision C, go to step f.

f. Check seating of IC U33 in socket. If problem not solved, go to step g.

g. Replace PCON board (see section 5 for removal, section 8 for installation of replacement)

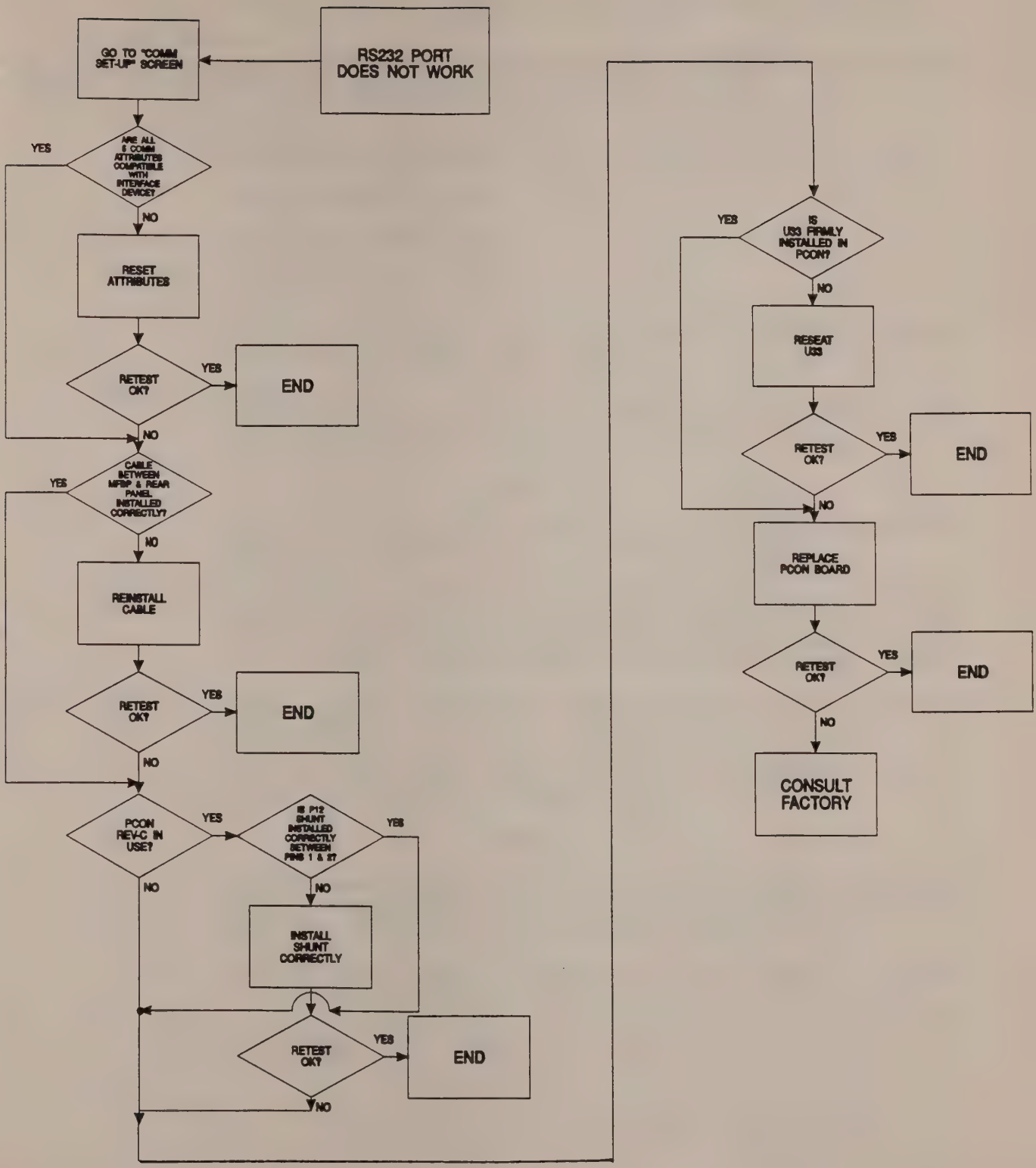


Figure 3-12. RS-232 Port Does Not Work Flow Diagram

NOTE

Verify that jumpers P7 an P201 are properly positioned on the replacement PCON board for the existing floppy drive in the 7200 Mainframe (see figure B-5).

h. Repeat self-test (section 2, paragraph 2-2)

3-13 SYMPTOM: SYSTEM ASKING FOR CONFIGURATION OR TEST DISK

DESCRIPTION:

INSTALL CONFIGURATION OR TEST DISK message displayed during 7200 Mainframe power-up

POSSIBLE FAULTS:

1. CPU(A) board or PCON board seating problem
2. Defective DC-DC board
3. Defective PCON board
4. Defective CPU(A) board
5. Defective data cable J22 and/or control cable J23 between PCON board and hard disk drive

REPAIR STEPS:

a. Refer to figure 3-13. Reseat CPU(A) board and PCON board. If problem solved, go to step f

NOTE

Reseating the CPU(A) board will invalidate the BRAM. Refer to paragraph 3-1 for corrective action.

b. Find connector P42 on DC/DC board (see figure B-2) and verify presence of 12 VDC (yellow wire) and 5 VDC (red wire). If not present, replace DC/DC board (see section 5 for removal, section 8 for installation of replacement)

c. Verify proper connection and condition of cables J22 and J23. Repair or replace, if necessary

d. Replace PCON board (see section 5 for removal, section 8 for installation of replacement)

NOTE

Verify that jumpers P7 an P201 are properly positioned on the replacement PCON board for the existing floppy drive in the 7200 Mainframe (see figure B-5).

e. Replace CPU(A) board (see section 5 for removal, section 8 for installation of replacement)

f. Repeat self-test (section 2, paragraph 2-2)

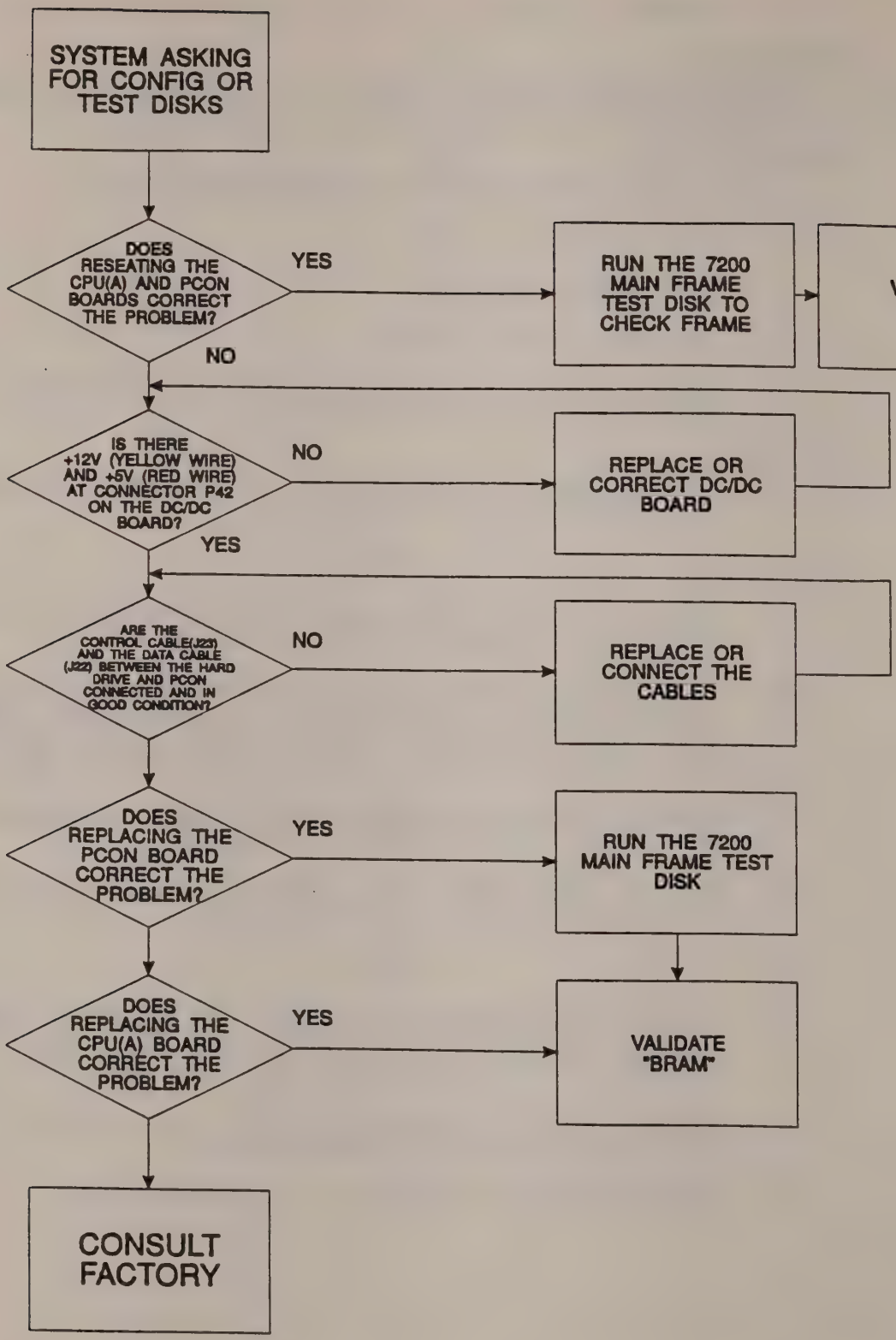

SYSTEM ASKING FOR CONFIG OR TEST DISKS
DOES RESEATING THE CPU(A) AND PCON BOARDS CORRECT THE PROBLEM?
YES
RUN THE 7200 MAIN FRAME TEST DISK TO CHECK FRAME
VALIDATE "BRAM"
NO
IS THERE +12V (YELLOW WIRE) AND +5V (RED WIRE) AT CONNECTOR P42 ON THE DC/DC BOARD?
NO
REPLACE OR CORRECT DC/DC BOARD
YES
ARE THE CONTROL CABLE(J23) AND THE DATA CABLE (J22) BETWEEN THE HARD DRIVE AND PCON CONNECTED AND IN GOOD CONDITION?
NO
REPLACE OR CONNECT THE CABLES
DOES REPLACING THE PCON BOARD CORRECT THE PROBLEM?
YES
RUN THE 7200 MAIN FRAME TEST DISK
DOES REPLACING THE CPU(A) BOARD CORRECT THE PROBLEM?
YES
VALIDATE "BRAM"
CONSULT FACTORY

Figure 3-13. System Asking For Configuration or Test Disks Flow Diagram

SECTION 4 ADJUSTMENTS

4-1 Display Subsystem

Whenever any part of the display subsystem (the DSPL board, the VAB, or the CRT) is replaced, six adjustments must be performed: display intensity, offset, gain, raster clock, vectors, and focus. These adjustments are described in detail in the subparagraphs that follow.

4-1.1 Intensity

Intensity must be adjusted with the 7200 Mainframe at room temperature and immediately after power is applied. To adjust intensity, use the following procedure:

a. Refer to figure 2-1. With power off, remove four screws and remove top cover to gain access to VAB board.

b. Apply power to 7200 Mainframe, then press Configure System softkey (7, figure A-1) and Screen Intensity softkey to isplay screen intensity menu.

c. Check that trace and test set to "90" and grid set to "70".

d. Find display intensity potentiometer R3 on VAB (figure B-8) and rotate completely counterclockwise to ensure minimum display intensity at turn-on.

e. Apply power to 7200 Mainframe. Rotate R3 clockwise slowly until bright spot appears near center of CRT. Rotate R3 counterclockwise until spot just disappears.

f. Reinstall top cover by reinstalling with four screws in reverse order of disassembly.

4-1.2 Offset and Gain

To adjust horizontal and vertical offset and gain, use the following procedure:

a. Refer to figure 2-1. With power off, remove four screws and remove top cover to gain access to DSPL board.

b. Apply power to 7200 Mainframe.

c. Install 7200 Mainframe Test diskette in floppy drive.

d. Press GRID. Full screen grid will be displayed.

e. On DSPL board (figure B-4), adjust horizontal gain potentiometer R91 and horizontal offset potentiometer R105 to optimize size and position (grid should be full screen in width and centered).

f. Adjust vertical gain potentiometer R132 and vertical offset potentiometer R183 to optimize size and position.

g. Reinstall top cover by reinstalling with four screws in reverse order of disassembly.

NOTE

Potentiometers R67, R85, and R199 are factory adjusted with special test fixtures. They should not be adjusted in the field.

4-1.3 Raster Clock

To adjust the raster clock, use the following procedure:

a. Refer to figure 2-1. With power off, remove four screws and remove top cover to gain access to DSPL board.

b. Install raster clock adjustment diskette in floppy drive and boot up 7200 Mainframe. Display will resemble figure 4-1. Rotate raster clock adjust potentiometer (see figure B-4) until TEST OF RASTER CLOCK text and face in lower left corner are as well defined as possible. Check that three fields of horizontal lines are stable (do not appear to be moving).

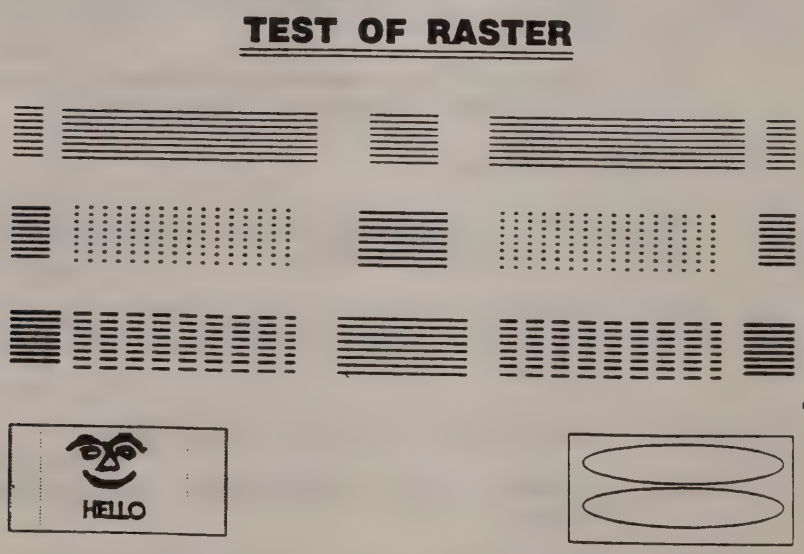


Figure 4-1. Raster Clock Adjustment

c. Remove raster clock adjustment diskette and press Help softkey to exit from raster test.

4-1.4 Vectors

To perform vector adjustments, use the following procedure:

a. Press Help softkey twice to display full screen of text.

b. Rotate end vector adjust potentiometer R205 and start vector adjust potentiometer R206 to optimize text clarity. Using letter O as example (see figure 4-2), there should be no gaps between vectors and no overlapping bright sections of text.

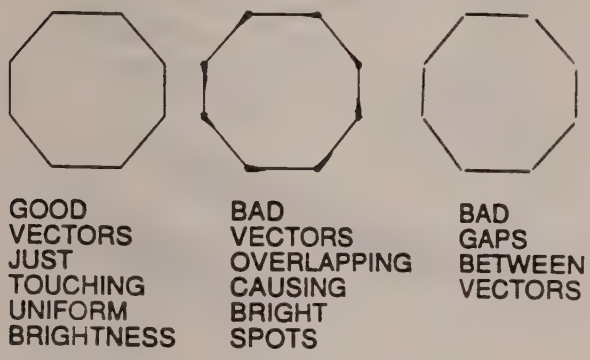

GOOD VECTORS JUST TOUCHING UNIFORM BRIGHTNESS
BAD VECTORS OVERLAPPING CAUSING BRIGHT SPOTS
BAD GAPS BETWEEN VECTORS

Figure 4-2. Vector Adjustment

4-1.5 Focus

The ideal time to adjust focus is just after completing vector adjustment. Use the following procedure:

Rotate display focus potentiometer R1 on VAB to achieve best focus.

4-2 Power Supply Outputs

The +24vdc and + 5vdc outputs of the power supply are checked at the top of the DC-DC converter on the DSPL board in the 7200 Mainframe card cage and adjusted from underneath the Rear with the Rear removed. To prepare for power supply output checks, use the following procedure:

a. Remove top cover in accordance with procedure in paragraph 2-2.1.1 and figure 2-1.

b. Remove 2 screws on either side of Rear (figure 4-3) to allow partial removal. Rotate 7200 Mainframe 90 degrees vertically to place on its side with bottom facing you.

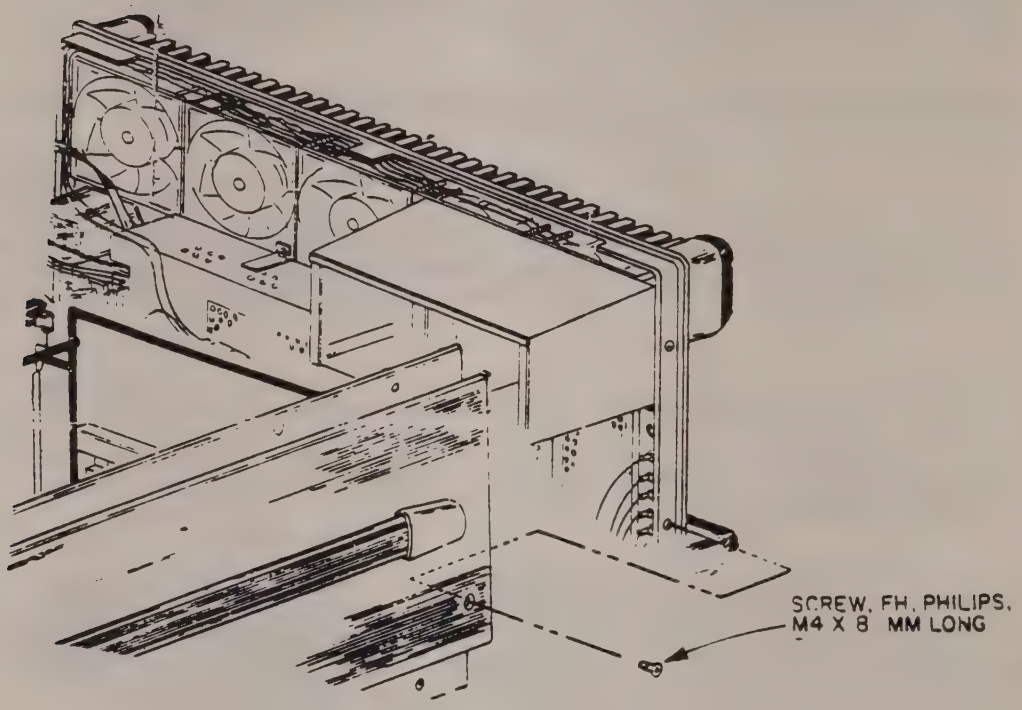


Figure 4-3. Partial Removal of Rear

NOTE

There are five holes in the bottom of the Rear. With the 7200 Mainframe positioned as described in step b., the top hole is for +5 vdc adjustment and the second hole from the top is for +24 vdc adjustment. The three remaining holes are not used for power supply adjustment.

c. Carefully remove Rear to expose +5 vdc and +24 vdc adjustment holes.

d. At top of DC-DC card inside card cage, find yellow +5 VDC test point J42.

e. Connect negative lead of multimeter to black wire of black-red pair.

f. Connect positive lead of multimeter to red wire.

g. Apply power to 7200 Mainframe and observe multimeter for reading of +5vdc. If voltage incorrect, insert small, flat-bladed screwdriver into 5-volt adjustment hole in bottom of Rear and rotate potentiometer until multimeter reads +5vdc, then remove power from 7200 Mainframe.

h. Find red +24 VDC test point J43 on DC-DC board. Connect negative lead of multimeter to white wire and connect positive lead to red wire.

i. Apply power to 7200 Mainframe and observe multimeter for reading of +24vdc. If voltage incorrect, insert small, flat-bladed screwdriver into 24-volt adjustment hole in bottom of Rear and rotate potentiometer until multimeter reads +24vdc, then remove power from 7200 Mainframe.

SECTION 5 MAJOR ASSEMBLY REMOVAL

WARNING

Before beginning removal of major assemblies, disconnect the 7200 Mainframe from its power source to prevent injury from electrical shock.

5-1 Front Panel Assembly, Side Assemblies, and Bottom Cover Assembly

The 7200 Mainframe is designed to provide easy access to internal assemblies and components after removal of the top cover, front panel assembly, side assemblies, and bottom cover assembly. To remove the top cover, refer to paragraph 2-2.1.1 and figure 2-1. To remove the front panel assembly, the left and right side assemblies, and the bottom cover assembly use the following procedure:

NOTE

The ribbon cable connected to J121 on the rear of the front panel assembly has a red stripe that identifies pin 1.

a. Behind front panel assembly, note how ribbon cable is dressed and that red stripe indicates pin 1 of P121 (see figure C-1) which mates with pin 1 of 60-pin connector J121, then disconnect J121.

b. Remove 4 screws (figure 5-1) that attach front panel assembly to side assemblies.

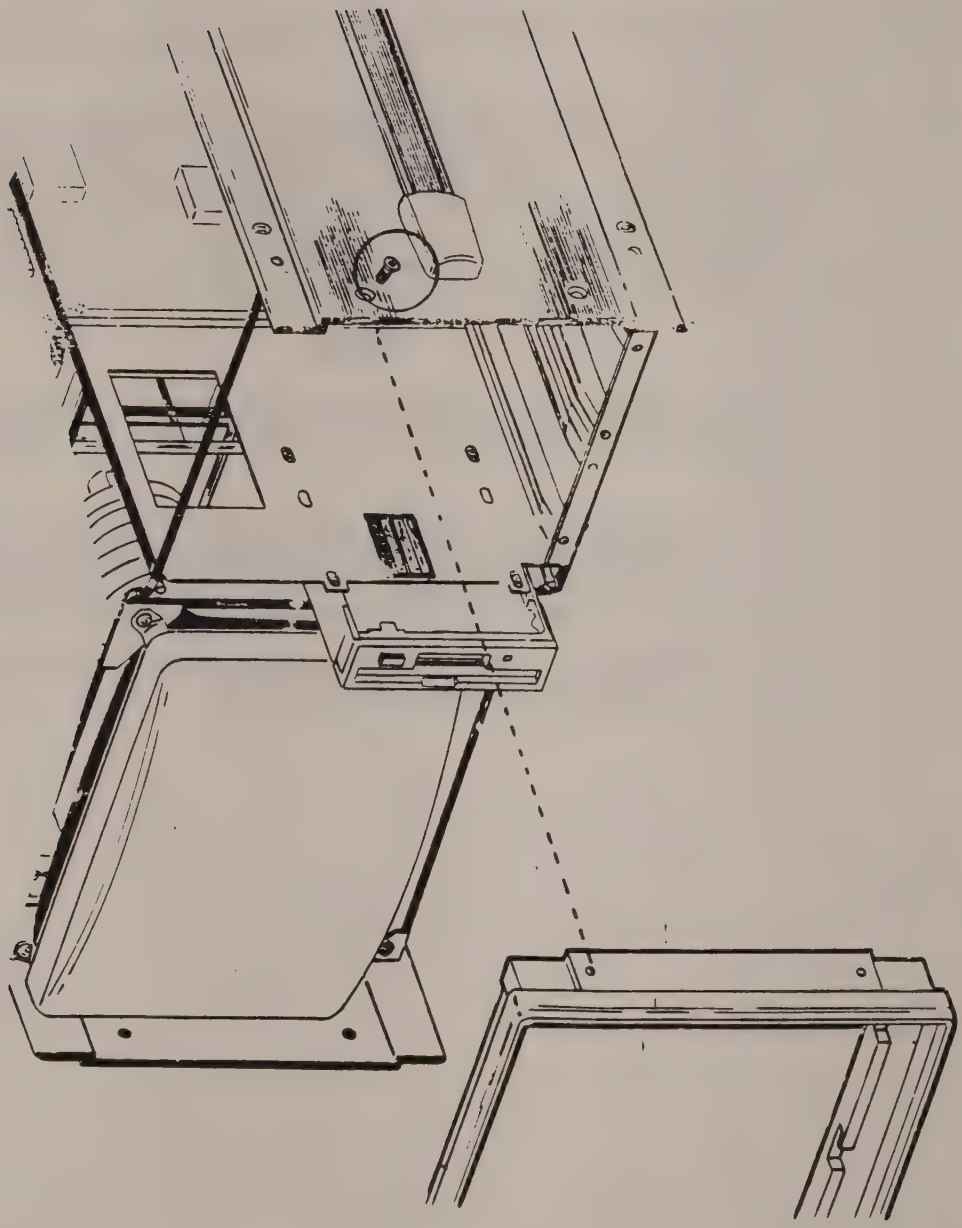


Figure 5-1. Front Panel Assembly Removal

NOTE

Tag all wires connected to the power switch, if necessary, for identification during reinstallation.

c. Pull front panel assembly out sufficiently to gain access to power switch. Tag all wires (figure 5-2) connected to power switch, if necessary, then disconnect.

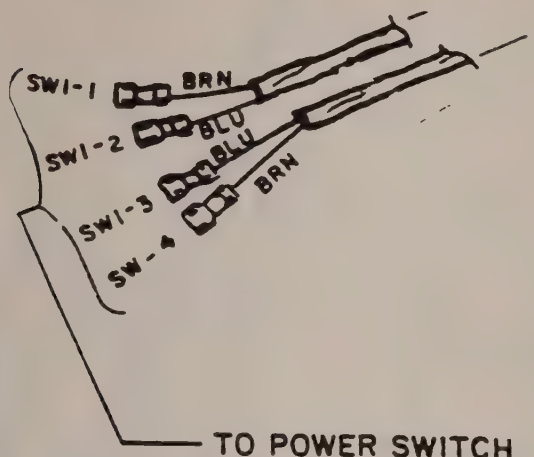


Figure 5-2. Power Switch Wire Disconnection

d. Remove 8 flat Phillips head screws (figure 5-3) that attach side assemblies to Rear.

e. Remove 5 flat head screws that attach left side assembly to DSPL board assembly.

f. Remove 2 flat Phillips head screws that attach left side assembly to bottom cover assembly.

g. Remove left side assembly.

h. Remove 2 flat Phillips head screws that attach right side assembly to bottom cover assembly.

i. Remove right side assembly.

j. Rotate 7200 Mainframe 90 degrees so that bottom cover assembly faces you. Remove 1 flat Phillips head screw (figure 5-4), lockwasher, and flat washer.

k. Remove bottom cover assembly.

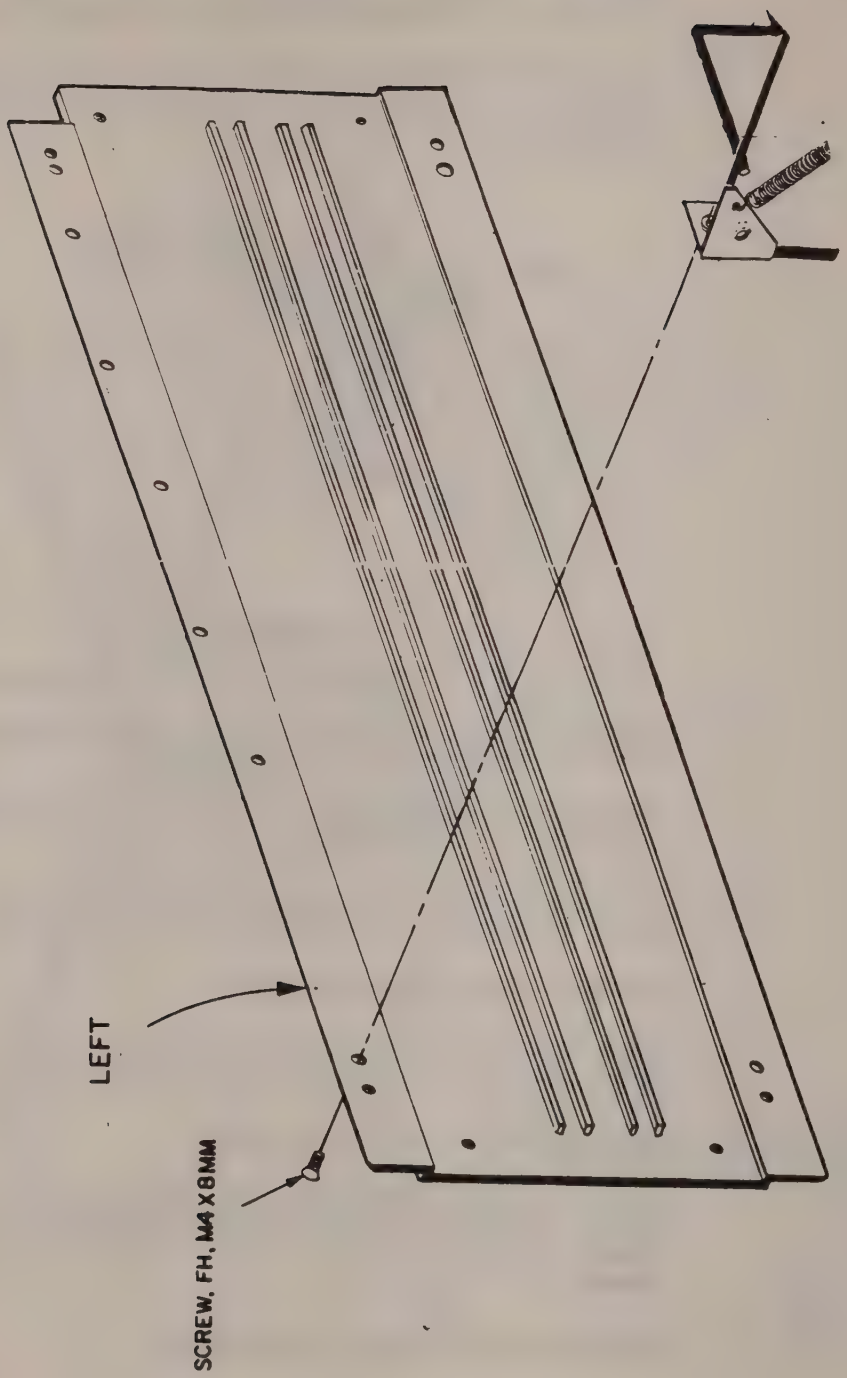


Figure 5-3. Left Side Assembly Removal

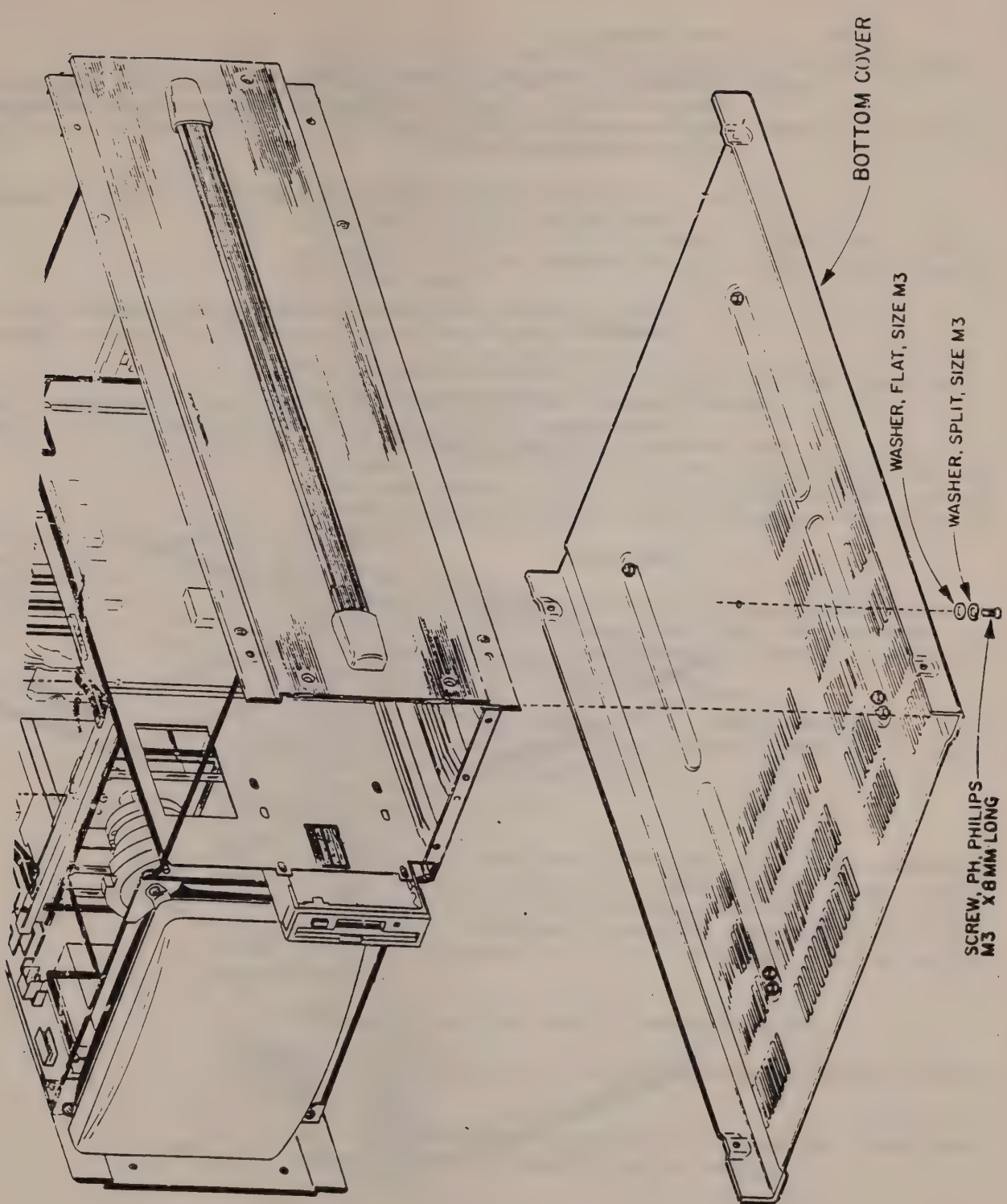


Figure 5-4. Bottom Cover Assembly Removal

5-2 CRT Assembly

The CRT is removed as an assembly with the deflection yoke attached, then disassembled to the extent necessary for servicing. To remove the CRT assembly, use the following procedure:

a. With front panel assembly removed, remove extension spring used to ground CRT.

NOTE

VAB connector J4 can be reconnected upside down. Be sure to note that the pin side of J4 faces up before disconnecting it.

b. Reach inside 7200 mainframe and disconnect yoke connector J5 (figure 5-5) and VAB connector J4 from P4 on DSPLY board.

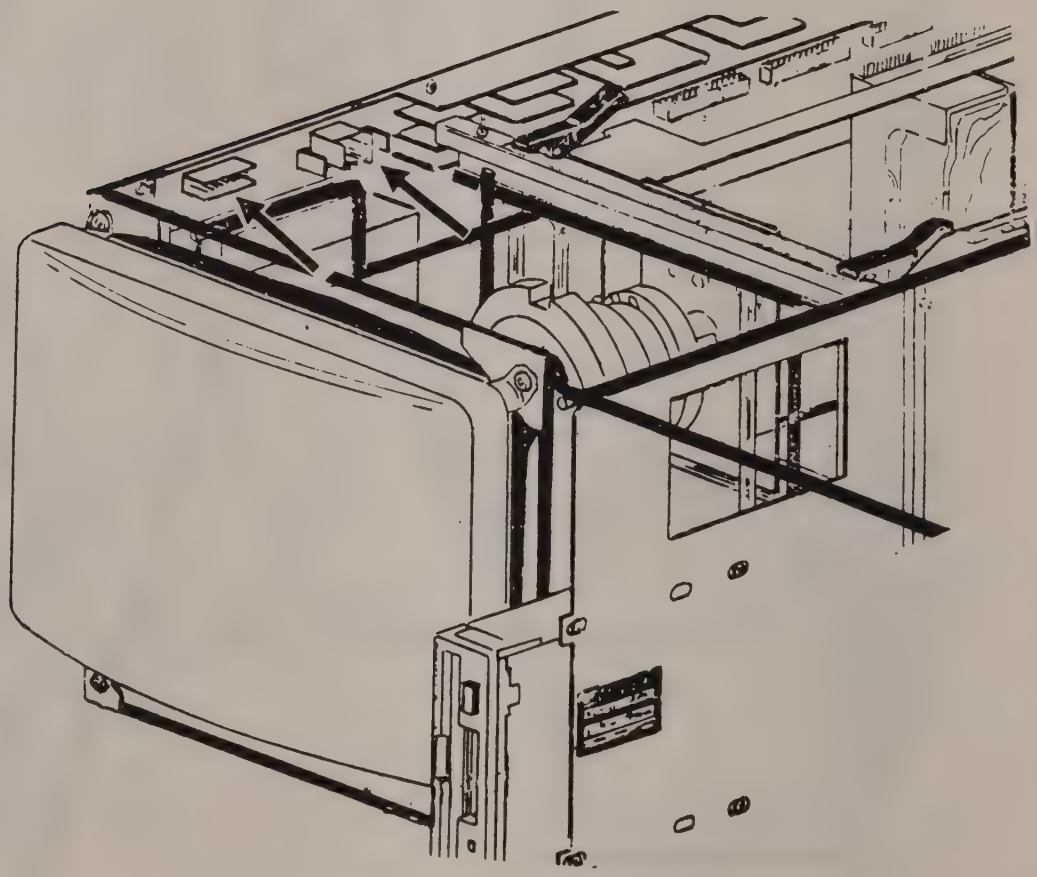


Figure 5-5. CRT Assembly Connector Disconnection

c. Cut wire ties that attach cable J4 to wire frame, being careful to avoid damaging wires.

d. Remove 2 screws which attach VAB support bracket to MFBP and remove bracket.

e. Remove VAB from CRT pins.

f. Remove 4 Phillips head screws (figure 5-6), split washers, and flat washers which attach CRT assembly to wireframe.

WARNING

The CRT may retain a high-voltage charge after power is removed from the 7200 mainframe.

d. Use shorting wire, long screwdriver, or test lead to connect second anode of CRT (located on side) to wireframe momentarily. Wait 10 minutes and ground second anode momentarily just before proceeding with removal.

WARNING

Protective clothing and safety glasses must be worn. Handle the CRT very carefully to prevent an implosion as a result of striking the removed CRT on some object or dropping it.

e. Remove CRT from front of 7200 mainframe with deflection yoke attached. Place assembly on soft cushion with faceplate down.

5-3 Display Board

The DSPL board is detached from the left side assembly when the left side assembly is removed. The front panel assembly ribbon cable is disconnected as part of CRT assembly removal. To remove the DSPL board from the card cage, refer to figure C-1 or C-2 and use the following procedure:

a. Disconnect 24 VDC supply cable from P6.

b. Lift DSPL board up and disconnect 60-pin ribbon cable P3.

c. Pull DSPL board up gently to remove from edge connectors P1-12 and P2-12 on MFBP.

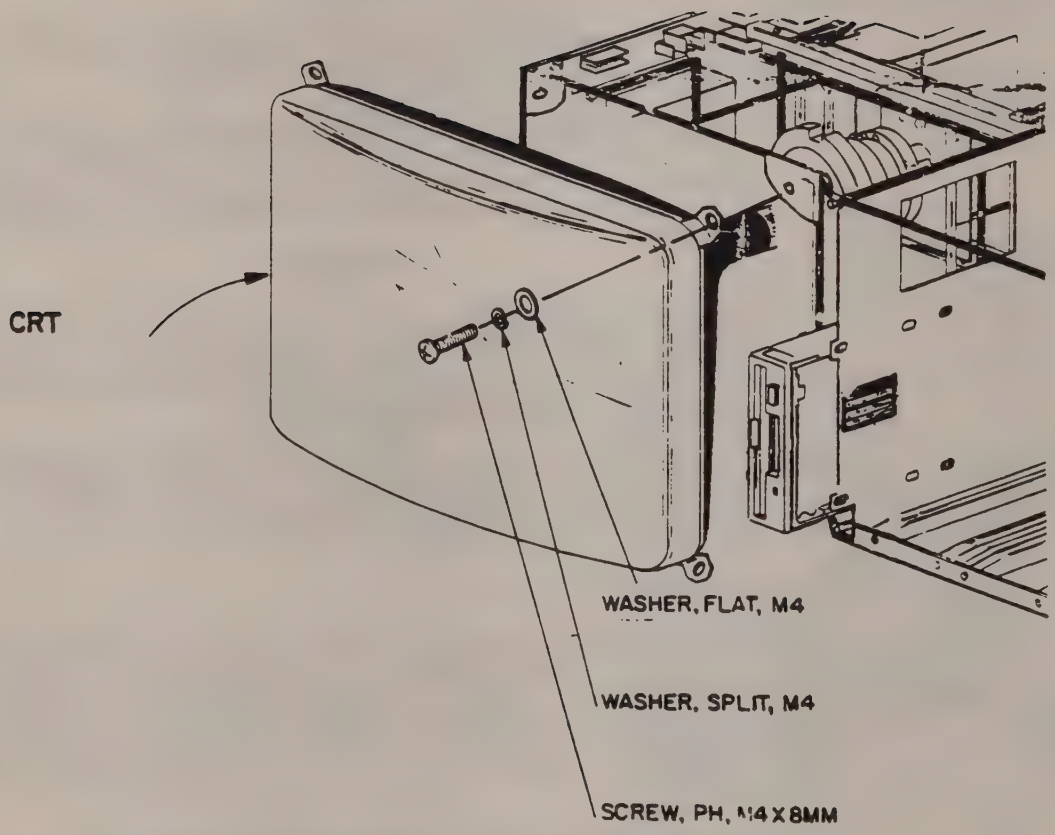


Figure 5-6. CRT Assembly Removal

5-4 Hard Disk Drive and Card Cage Boards

The card cage (figure 5-7) houses the hard disk drive assembly and four boards:

Peripheral Control Board (PCON)

DC-DC Board (DCDC)

System Clock Board (SClock)

Central Processing Unit (CPU) or Central Processing Unit A (CPUA) Board

All four boards plug into VME bus connectors mounted on the MFBP. The boards can be removed in any order.

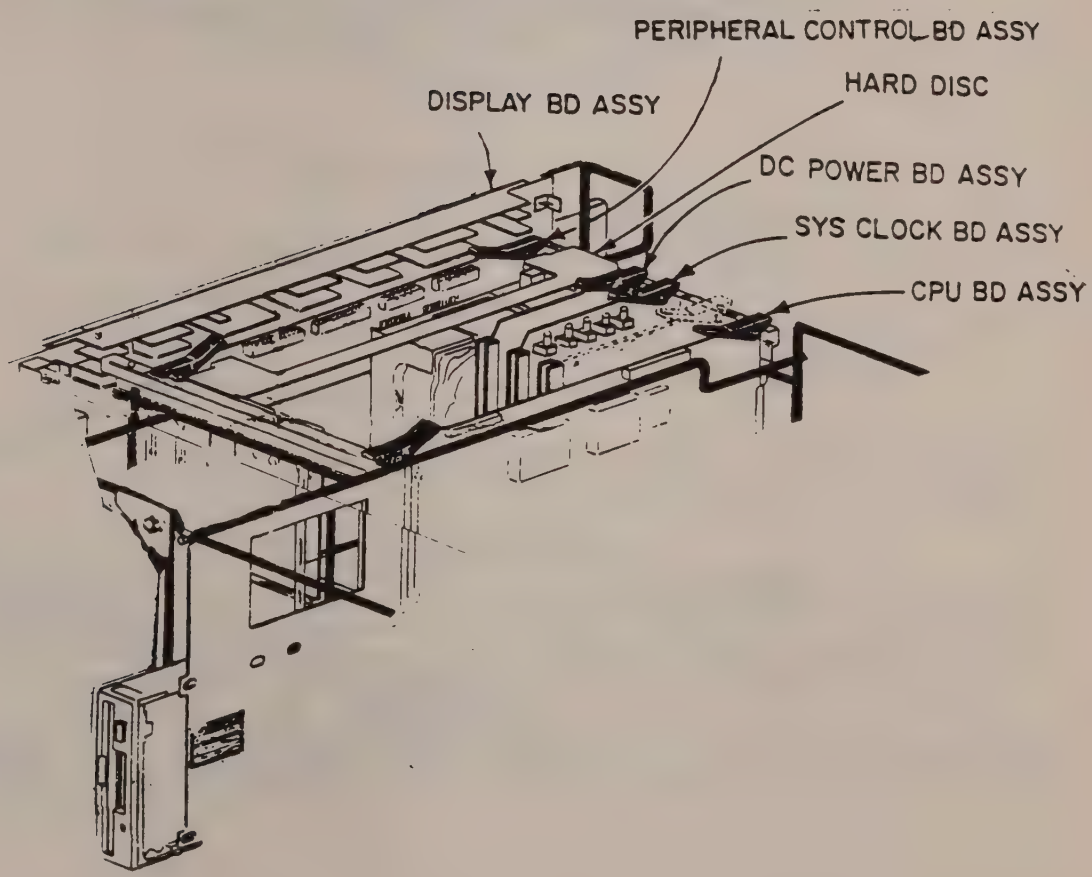


Figure 5-7. Card Cage

5-4.1 Peripheral Control Board

To remove the PCON board, use the following procedure:

a. Remove 6 flat Phillips head screws (figure 5-8) and 2 hold down bars to gain access to card ejectors.

b. Disconnect floppy drive cable P21 (see figures C-1 and C-2).

c. Disconnect hard disk data cable P22.

d. Disconnect hard disk control cable P23.

e. Disconnect GPIB cable P24.

f. Operate card ejectors to remove PCON from edge connectors P1-10 and P2-10 on MFBP.

5-4.2 DC-DC Board

With hold down bars removed, operate card ejector to remove DC-DC board from VME bus connector P1-6 on MFBP.

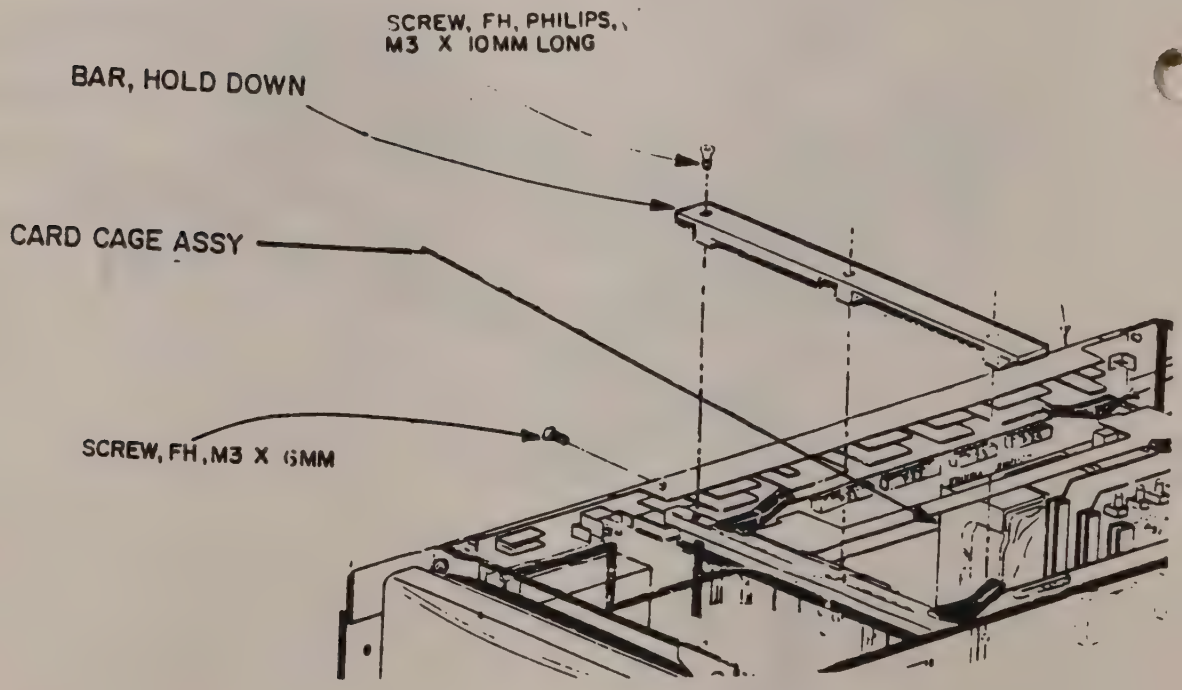


Figure 5-8. Hold Down Bar Removal

5-4.3 Hard Disk Drive Assembly

The hard disk drive assembly is shock mounted on pins in the mainframe backplane assembly (figure 5-9). With both hold down bars removed, the hard disk drive assembly is accessible for removal.

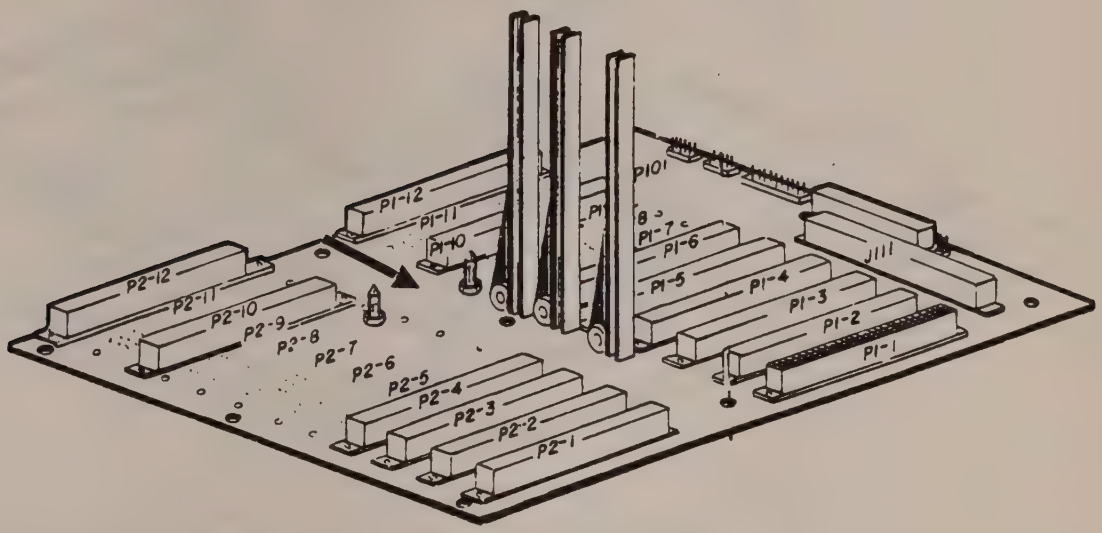


Figure 5-9. Hard Disk Drive Assembly Mounting Pins

To remove the hard disk drive assembly, grasp disk mount (figure 5-10) and pull assembly up and out of card cage.

5-4.4 System Clock Board

With hold down bar removed, operate card ejector to remove SClock board from VME bus connector P1-5 on MFBP.

5-4.5 Central Processing Unit Board

Central processing unit boards of two types are used in the 7200 mainframe. They are not functionally interchangeable, but are removed in the same way. T o remove the CPU(A) board, use the following procedure:

With both hold down bars removed, operate card ejectors to remove CPU(A) from VME bus connectors P1-1 and P2-1 on MFBP.

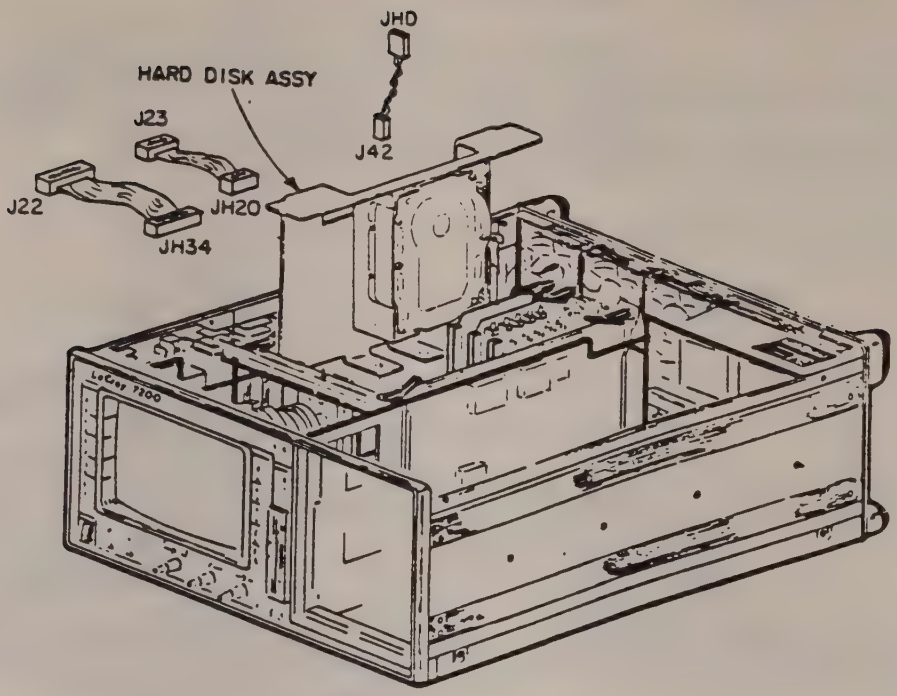


Figure 5-10. Hard Disk Drive Assembly Removal

5-5 Module Backplane Assembly

The module backplane assembly is removed after the hard disk drive assembly and all card cage boards have been removed. To remove it, use the following procedure:

b. Remove SMB connector J105 (TRIGGER BUS) from J113B, pin 8 (see figure C-2).

c. Carefully pull module backplane assembly up and out of 7200 mainframe to disconnect P111 from J111 on mainframe backplane assembly (figure 5-11), then remove module backplane assembly (figure 5-12) and SMA connector panel subassembly.

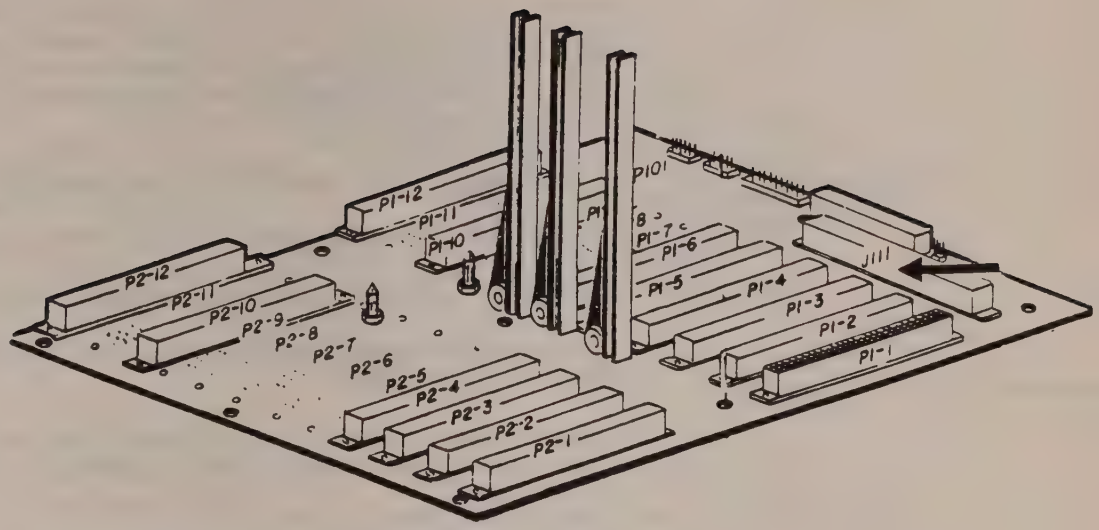


Figure 5-11. Mainframe Backplane Assembly

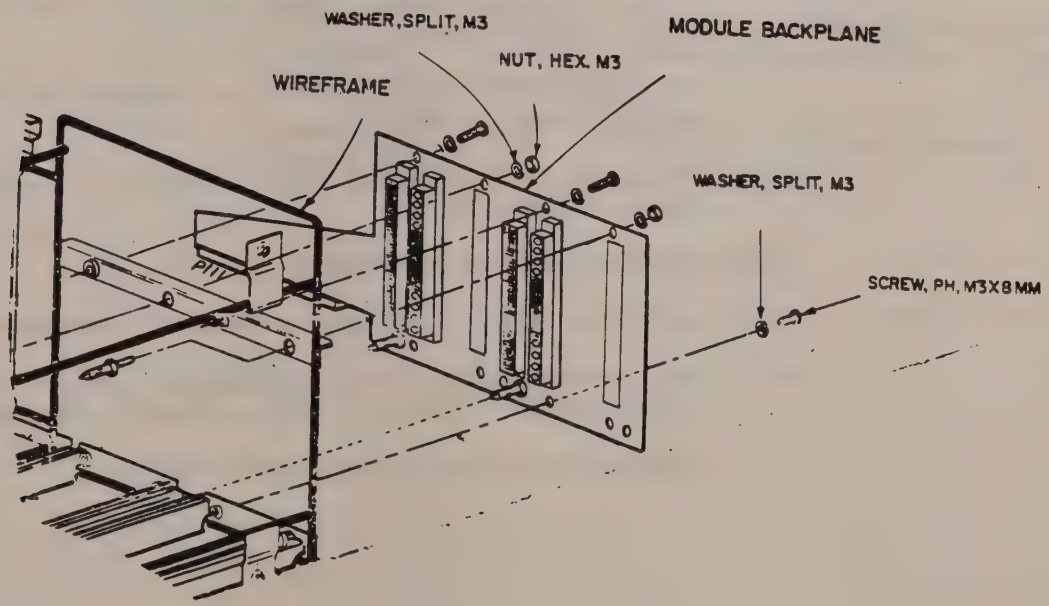


Figure 5-12. Module Backplane Removal

5-6 Rear

To remove the Rear, use the following procedure:

a. Remove four Phillips head screws (refer to figure 4-2) which attach Rear to side panel assemblies. Tip Rear back sufficiently to gain access to connectors. Refer to wiring diagrams in appendix C for connector identification.

b. Disconnect GPIB cable (P24) from J24 on PCON board.

c. Disconnect RS-232 cable (J102) from P102 on MFBP.

d. Disconnect printer cable (J103) from P103 on MFBP.

e. Disconnect green seven-position connector (J131) from P131 on Rear.

f. Note orientation of J43 (white wire toward front, red wire toward rear) and disconnect from P43 on DC-DC board.

g. Note Orientation of J6 (red wire toward top, white wire toward bottom) and disconnect from P6 on DSPL board.

h. Disconnect green 10-position connector (J104) from P104 on MFBP.

i. Note orientation of J105 (gray (pin 1) and violet (pin 3) wires toward front of unit) and disconnect from P105 on MFBP.

j. Use connector removal tool to remove two red and two white wires from MDBP.

k. Use connector removal tool to remove two white/black wires from MDBP.

5-7 Mainframe Backplane Assembly

To remove the MFBP, use the following procedure:

b. From underneath 7200 mainframe, remove 9 Phillips head screws (figure 5-13) and split washers.

c. Remove mainframe backplane assembly.

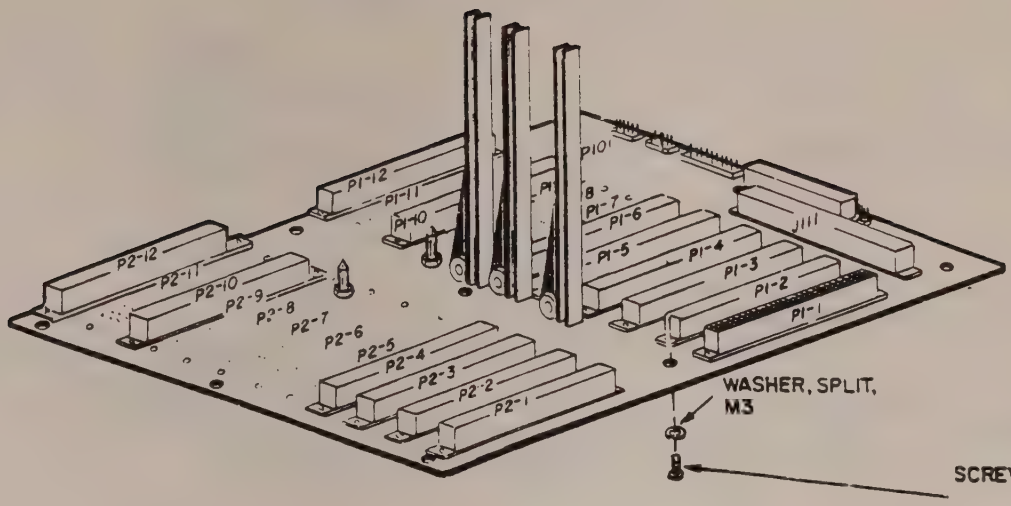


Figure 5-13. Mainframe Backplane Assembly Removal

5-8 Floppy Disk Drive Assembly

To remove the floppy disk drive assembly, use the following procedure;

a. Refer to figures C-1 and C-2. Note cable dress of edge connectors JF4 and JF34, then disconnect.

b. With plug-in modules removed as shown in figure 5-14, remove 4 flat Phillips head screws from sidewall of plug-in compartment.

c. Carefully remove floppy disc drive assembly and floppy shield.

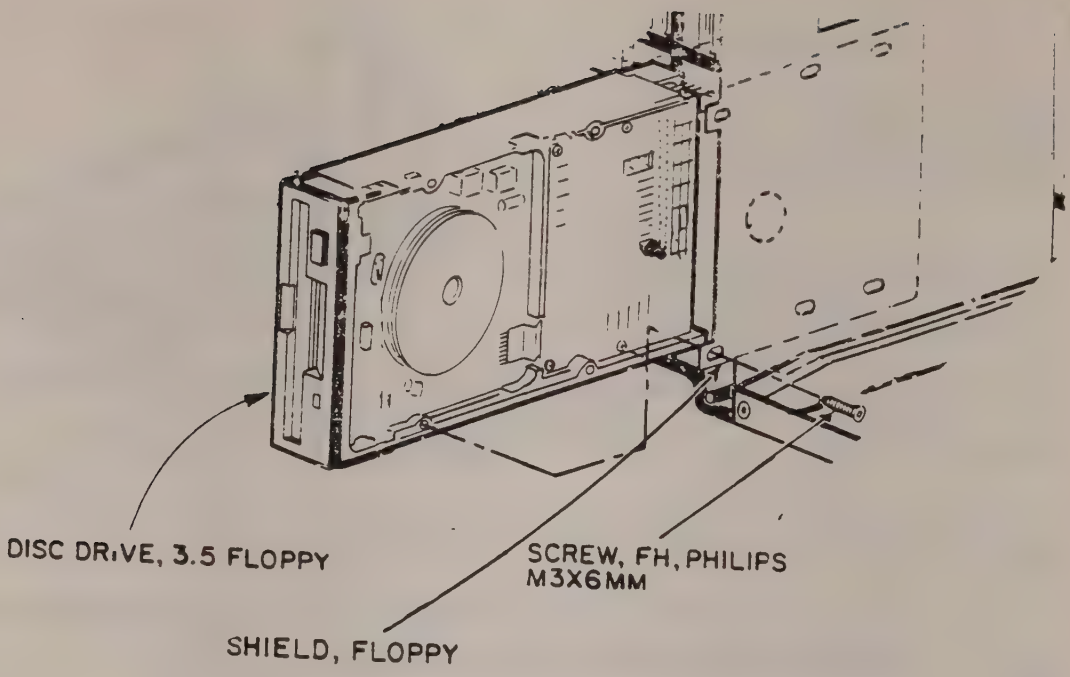


Figure 5-14. Floppy Disk Drive Assembly Removal

SECTION 6 DISASSEMBLY

6-1 Front Panel Assembly

To disassemble the front panel assembly, use the following procedure:

NOTE

The Move Cursor/Modify Value/Next Line, Vertical POSITION, and Horizontal POSITION knob caps are keyed to reassemble in only one way.

a. Use thin-bladed knife to pry caps (figure 6-1) off Move Cursor/Modify Value/Next Line, Vertical POSITION, and Horizontal POSITION knobs.

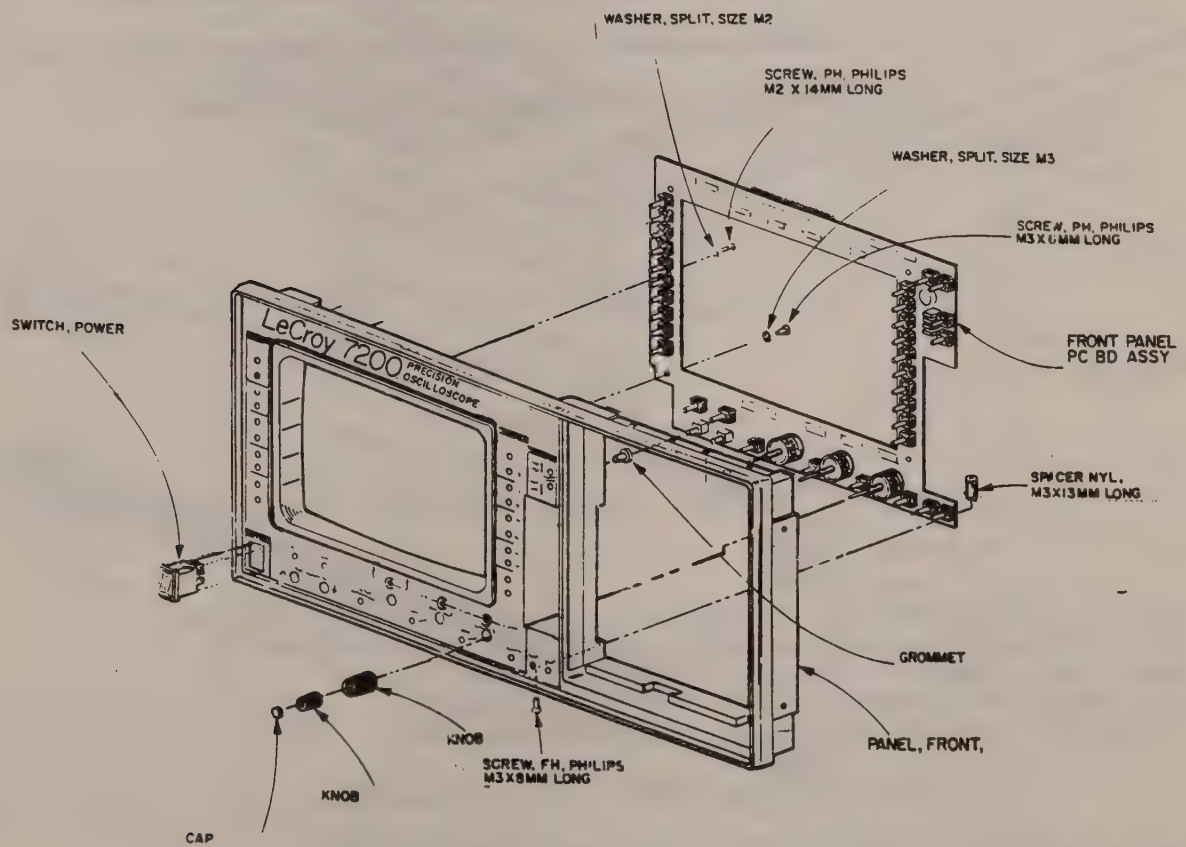


Figure 6-1. Front Panel Assembly Disassembly

b. Use screwdriver to loosen screw inside each knob a half-turn counterclockwise, then remove knob.

c. Use nutdriver to loosen nuts inside Select Cursor/Move Box/Next Topic, Vertical EXPAND, and Horizontal EXPAND knobs, then remove knobs.

d. Compress mounting springs to remove power switch.

e. Behind front panel assembly, remove 2 long Phillips head screws and split washers, then remove 5 short Phillips head screws and split washers.

f. Carefully remove front panel printed circuit board assembly from front panel.

6-2 Side Assemblies

To remove and disassemble the handles on either side assembly after the side assembly has been removed from the 7200 Mainframe, use the following procedure:

a. Behind assembly (figure 6-2), remove 2 10-32 nuts.

b. Remove 2 8-32 nuts, then remove handle.

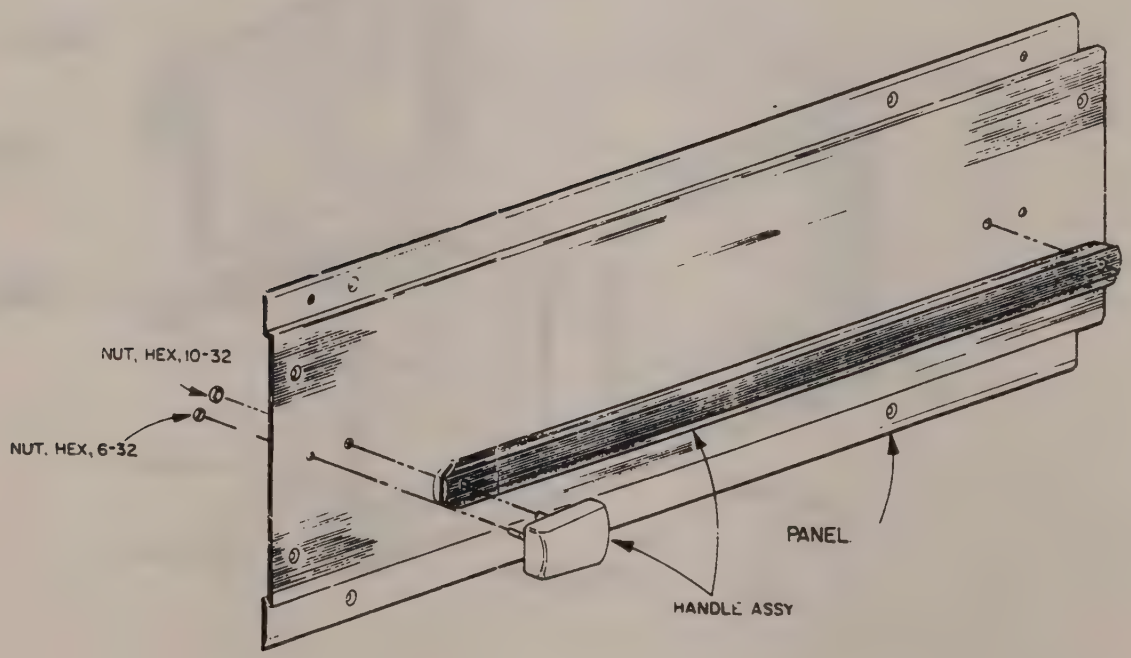


Figure 6-2. Side Assembly Disassembly

6-3 Bottom Cover Assembly

The bottom cover assembly may be disassembled if it is equipped with the optional tilt stand kit (figure 6-3). To disassemble the bottom cover assembly, use the following procedure:

a. Remove 2 hex nuts to release rear stiffener, 2 rear feet, and 2 Phillips head screws.

b. Remove 4 hex nuts and 4 split washers to release front stiffener, left foot, right foot, 1 10-inch wire rail, and 2 Phillips head screws.

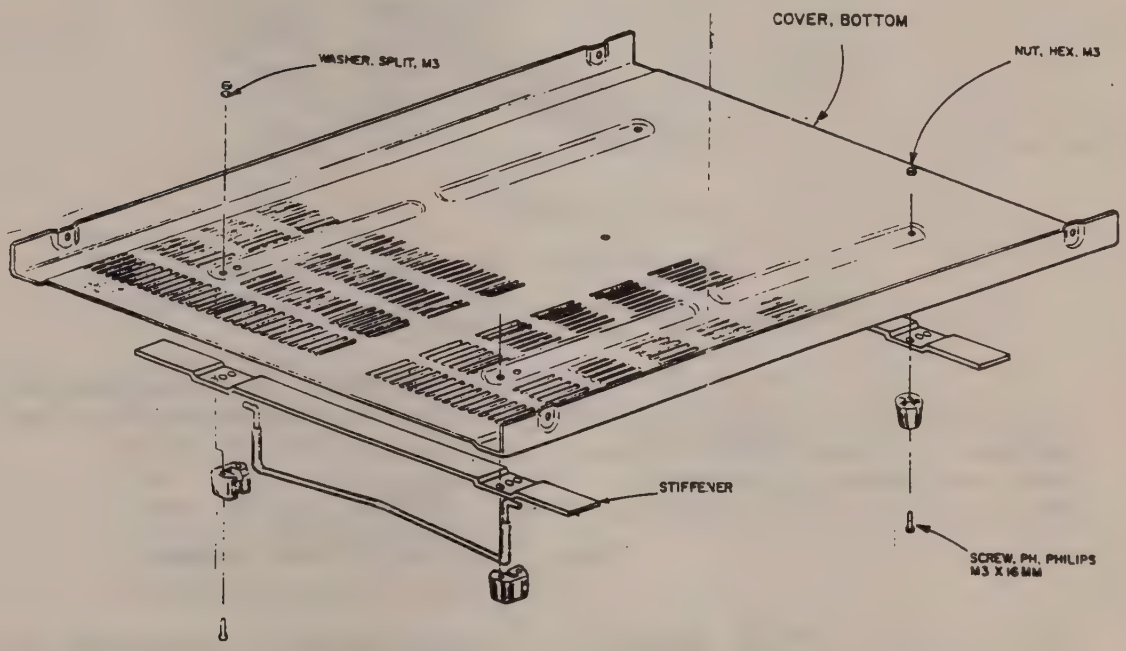


Figure 6-3. Bottom Cover Assembly Disassembly

6-4 CRT Assembly

The CRT assembly is disassembled by removing the yoke assembly. The deflection yoke is removed from the neck of the CRT after the CRT assembly has been removed from the 7200 Mainframe. To remove the deflection yoke, use the following procedure:

a. Mark position of yoke on neck of CRT.

b. Note orientation of J5, then loosen clamping screw and slide deflection yoke off neck of CRT.

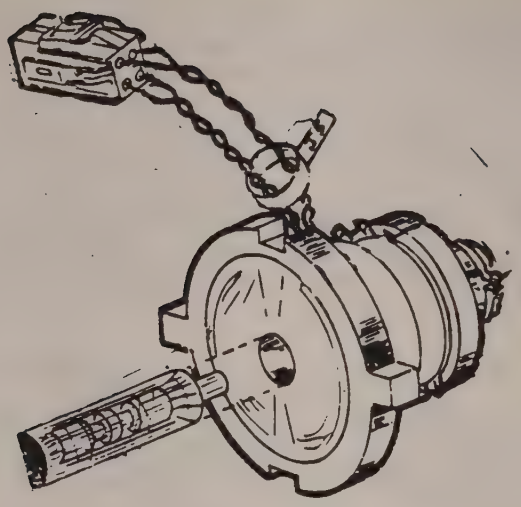


Figure 6-4. CRT Assembly Disassembly

6-5 Hard Disk Drive Assembly

The hard disk drive assembly is disassembled after it has been removed from the card cage. Use the following procedure:

NOTE

Edge connectors face upward.

a. Note position of edge connectors for later reassembly, then from rear of disk mount remove 4 Phillips head screws (figure 6-5) and split washers to remove disk drive.

b. Remove two grommets from disk mount.

6-6 Rear Panel Assembly

The rear panel assembly is disassembled further after removal from the 7200 Mainframe by removing the axial fans, the shield subassembly, the rear interface panel subassembly, the SMA connector panel subassembly, and the power supply printed circuit board subassembly.

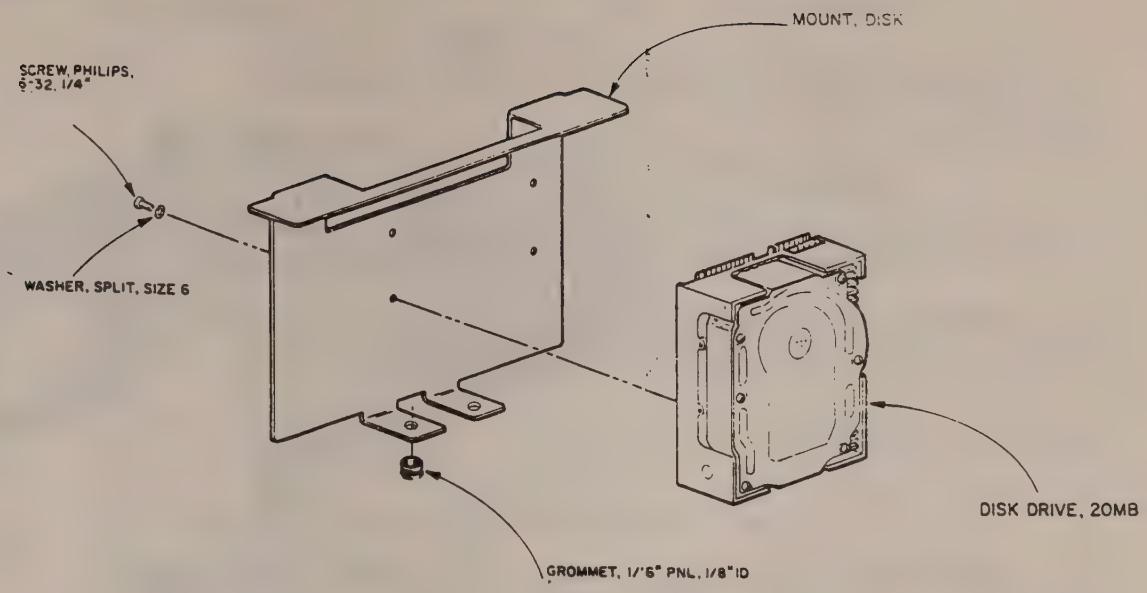


Figure 6-5. Hard Disk Drive Assembly Disassembly

6-6.1 Axial Fans

There are five axial fans on the rear panel: Three are used for cooling the card cage. Two are used for cooling the plug-in compartment. Separate procedures are provided for removal of axial fans in the card cage and the plug-in compartment.

Card Cage Axial Fans

The card cage axial fan in figure 6-6 is typical, but requires a more detailed removal procedure than the other two. To remove the fan, use the following procedure:

a. Remove nut (figure 6-7), shakeproof washer, and GND2 wire from GND2 stud on rear panel. Reinstall shakeproof washer and nut for later reassembly.

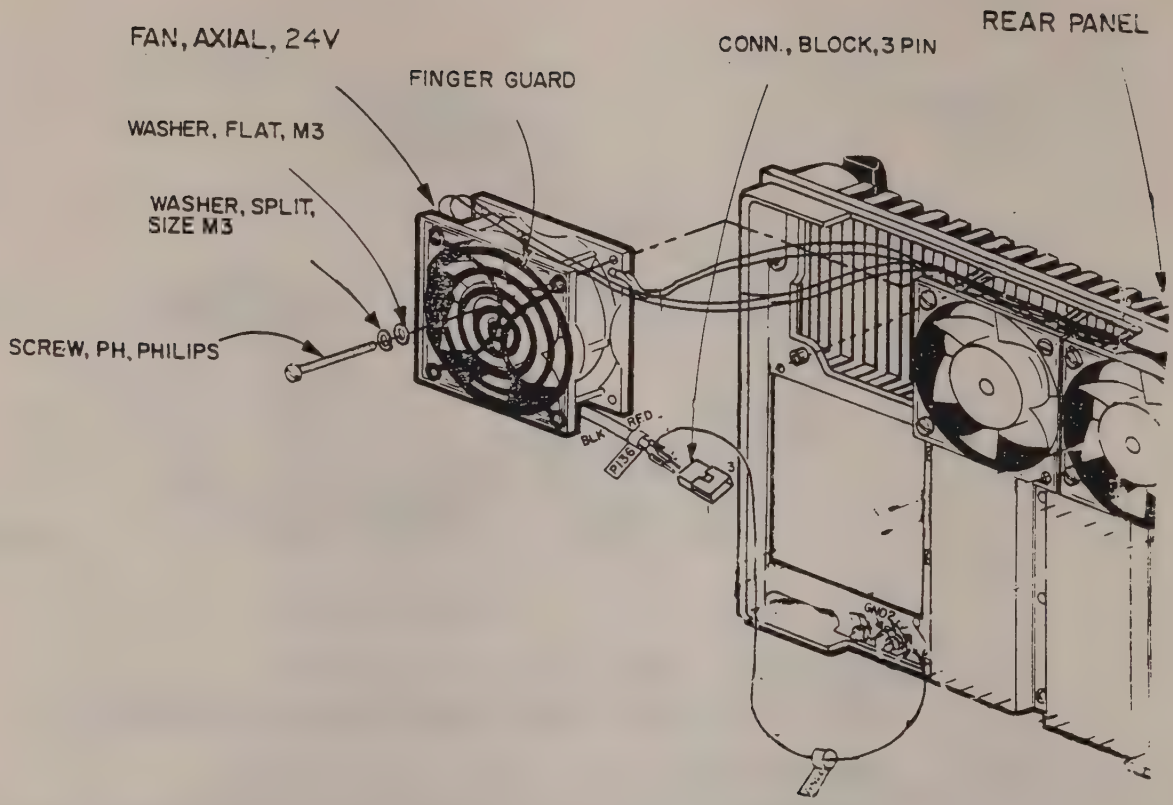


Figure 6-6. Axial Fan Removal (Typical)

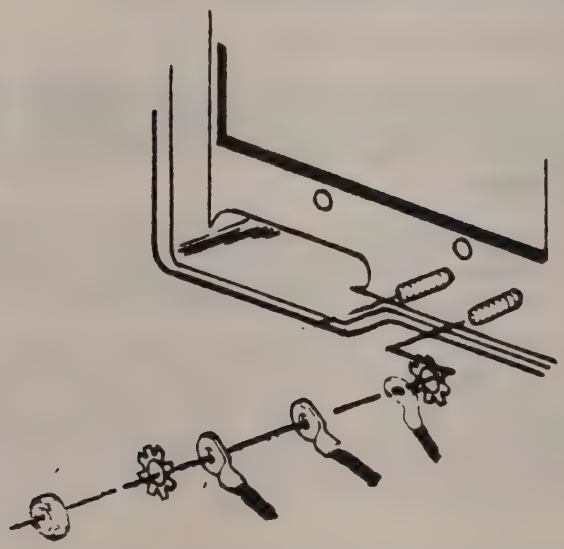


Figure 6-7. Ground 2 Removal

NOTE

Connectors P136 and J136 should be tagged, if necessary, for identification during reassembly.

b. Disconnect P136 (see figure 6-6) from J136 on shield subassembly.

c. Remove 4 long Phillips head screws, split washers, and flat washers, finger guard, and axial fan.

d. If further disassembly is required, remove heat shrink tubing from soldered connections of red and black wires and unsolder connections.

e. Remove other two card cage axial fans by using steps c. and d.

Plug-In Compartment Axial Fans

The three axial fans for the plug-in compartment are housed in a fan hood. To remove any or all of these fans, use the following procedure:

a. Remove Phillips head screw (figure 6-8), split washer, and flat washer, then remove fan hood.

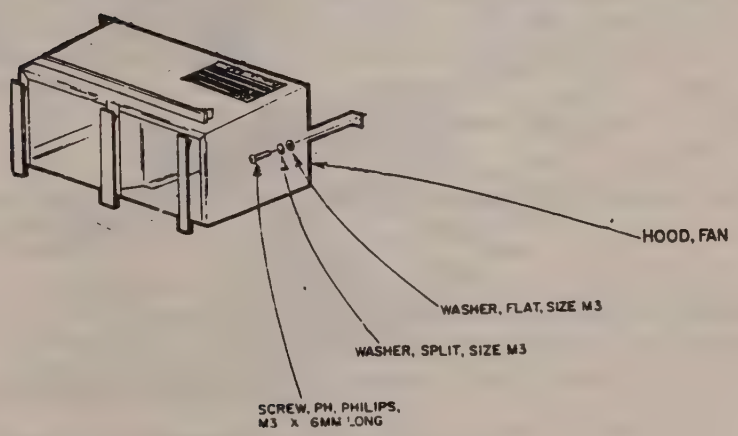


Figure 6-8. Fan Hood Removal

b. Remove 4 long Phillips head screws (see figure 6-6), split washers, and flat washers, finger guard, and axial fan.

c. If further disassembly is required, remove heat shrink tubing from soldered connections of red and black wires and unsolder connections.

6-6.2 Shield Subassembly

The shield subassembly is removed after the axial fans have been removed. Connector J6 is disconnected when the display board assembly is removed; connector J43 is disconnected when the DC power converter board is removed; connector J136 is disconnected when the axial fans are removed; female crimp contacts P113A2, P113A3, P113B2, and P113B3 are removed when the module backplane assembly is removed; and connectors J104 and J105 are disconnected when the mainframe backplane assembly is removed. To remove the shield assembly, use the following procedure:

a. From underneath rear panel, remove 2 Phillips head screws (figure 6-9).

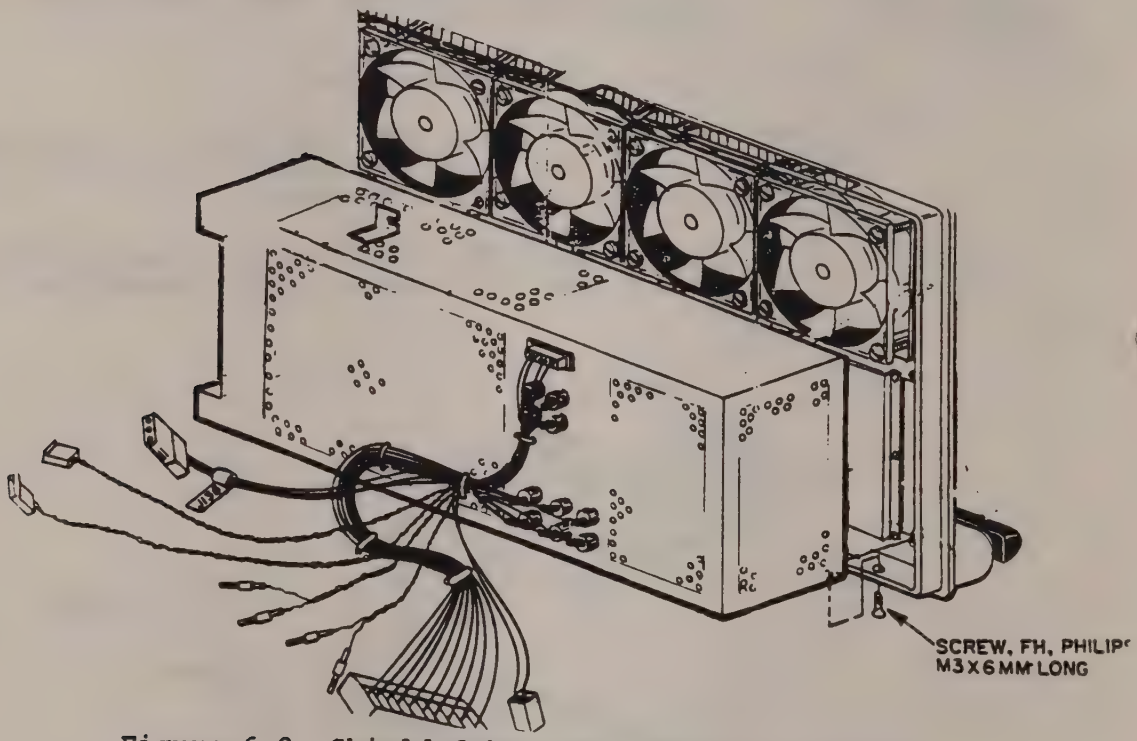


Figure 6-9. Shield Subassembly Hardware Removal

b. Remove shield subassembly carefully and disconnect J134 and J135 (figure 6-10) from power supply printed circuit board subassembly, then remove shield subassembly.

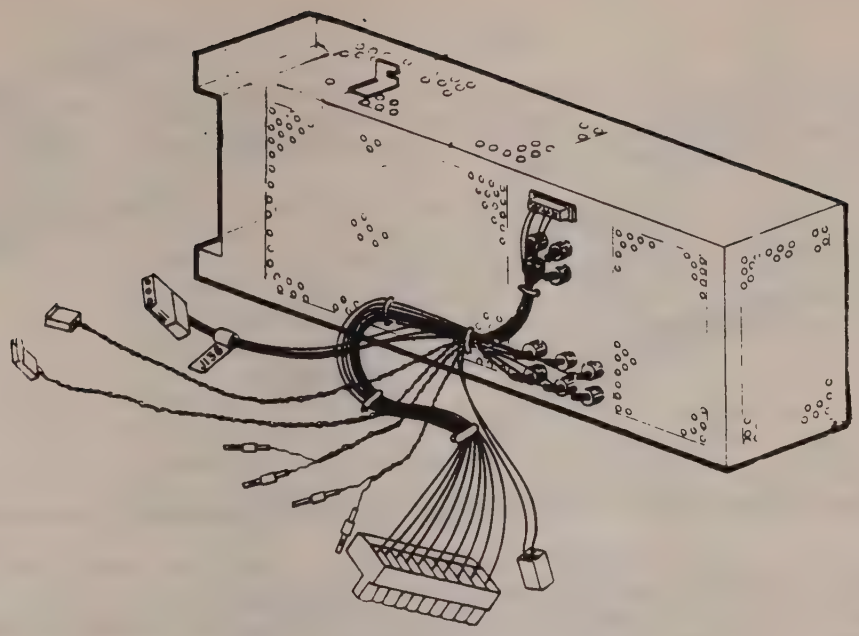


Figure 6-10. Shield Subassembly Connector Disconnection

6-6.3 Back Panel Interface

The back panel interface is removed after the axial fans and the shield subassembly have been removed. To disassemble the back panel interface, use the following procedure:

NOTE

Connector identification should be noted before disconnection.

a. Disconnect J131, voltage selection cable connector J132 (figure 5-11) and AC input cable connector J133 from P132 and P133 on power supply printed circuit board subassembly.

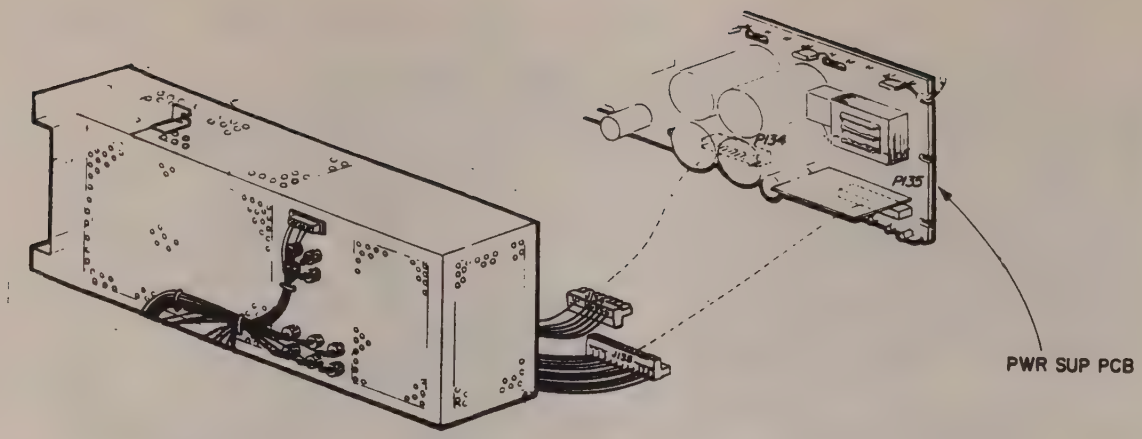


Figure 6-11. Power Supply PCB Connector Disconnection

b. Remove fused ac connector and voltage switch subassembly by removing 2 hex nuts, lockwashers, and flat washers, then remove subassembly and remove 2 screws from front of subassembly. Disassemble further, if necessary, by removing fuse drawer and fuses and pulling boot away to unsolder wires from terminals.

c. Remove nut (figure 6-12), split washer, flat washer, and shakeproof washer from GND1 stud on rear panel, then remove GND1 wire from stud.

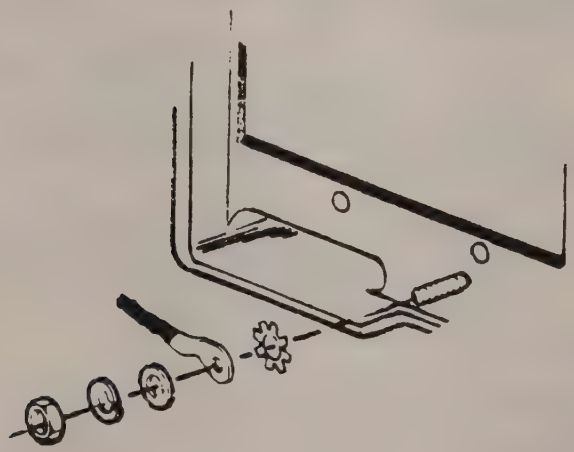


Figure 6-12. Ground 1 Removal

NOTE

All ribbon cables connected to the rear interface panel sub-assembly should be tagged for identification during reassembly.

d. Note orientation of GPIB connector J144 (figure 6-13) and ribbon cable for later reassembly, then remove connector by removing two hex nuts, lockwashers, and flat washers from inside of subassembly, and removing 2 hex standoffs from outside of subassembly.

e. Note orientation of RS-232 connector J143 and ribbon cable for later reassembly, then remove connector by removing 2 hex nuts and lockwashers from inside of subassembly and 2 hex standoffs from outside of subassembly.

f. Note orientation of printer connector J142 for later reassembly, then remove connector by removing 2 hex nuts and lockwashers from inside of panel and 2 hex standoffs from outside of panel.

6-6.4 Power Supply Printed Circuit Board Subassembly

The power supply printed circuit board subassembly is removed after the shield and rear interface panel subassemblies have been removed. To remove it, use the following procedure:

a. Remove 5 short Phillips head screws (figure 6-14), split washers, and flat washers.

b. Remove 4 long Phillips head screws, split washers, and flat washers.

c. Disconnect power supply ground wires.

d. Unsolder power converters U1 through U4.

e. Remove power supply printed circuit board subassembly.

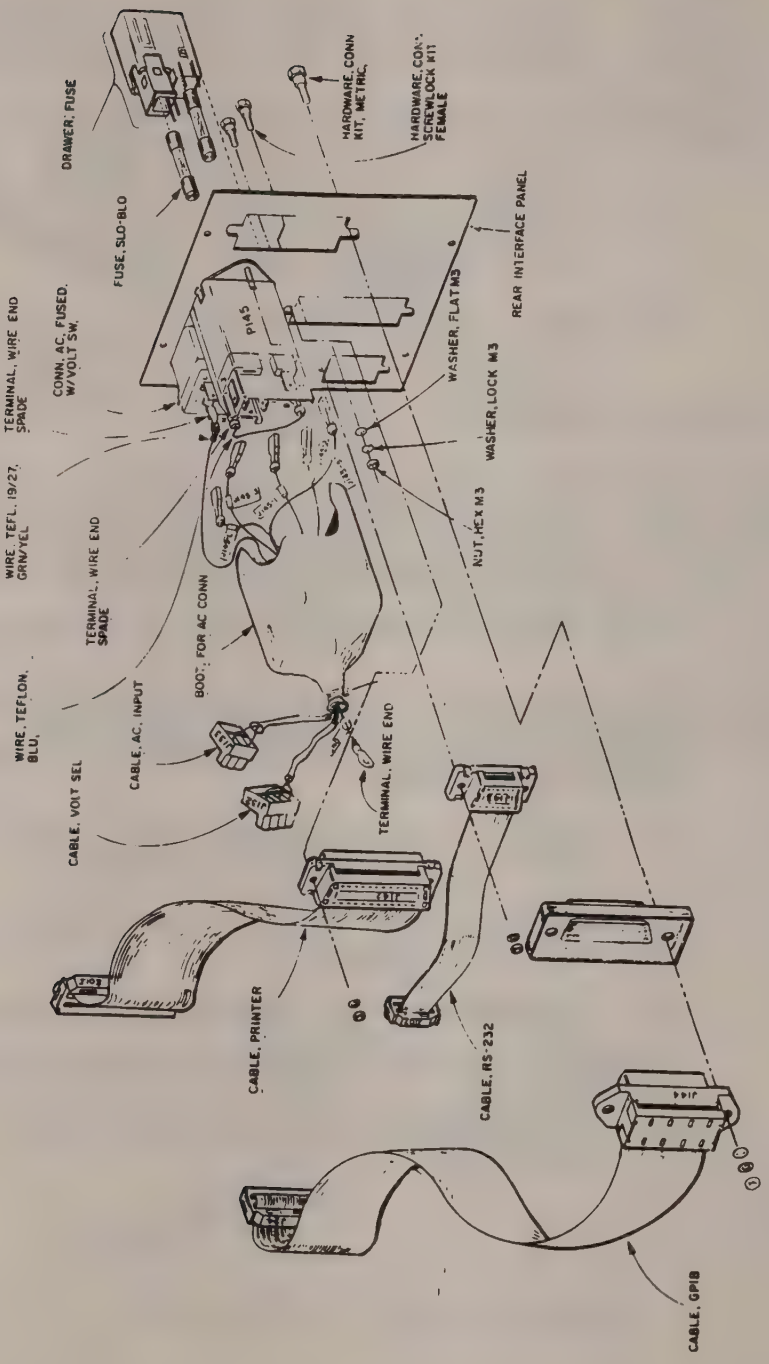


Figure 6-13. Back Panel Interface Disassembly

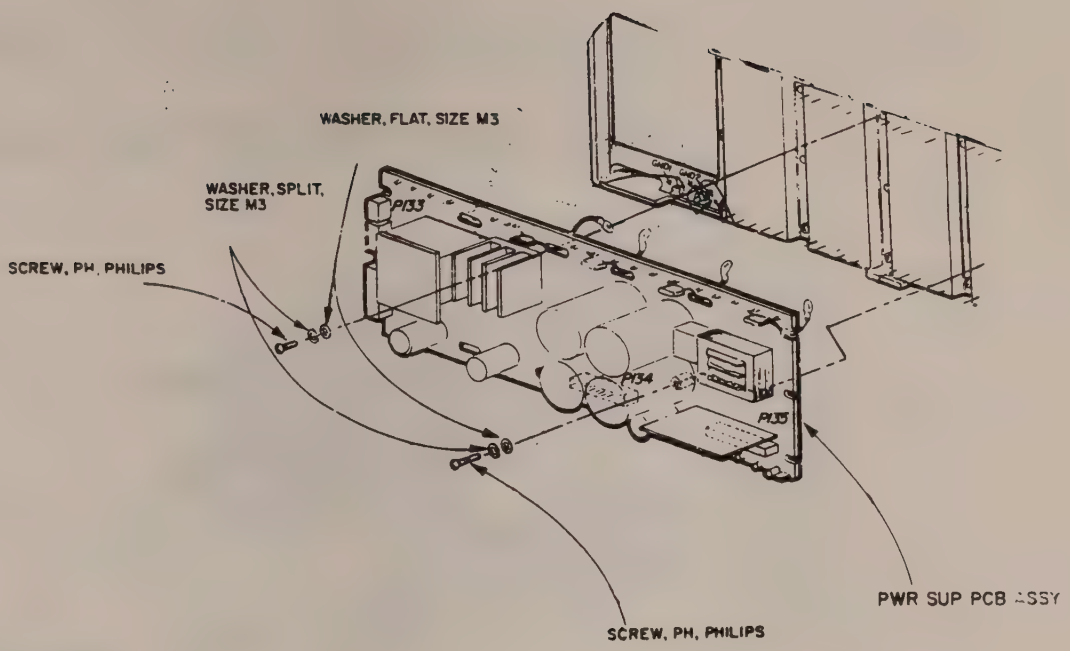


Figure 6-14. Power Supply PCB Removal

6-6.5 Power Converters

With the power supply printed circuit board subassembly removed, any power converter (U1 through U5) can be removed by using the following procedure:

a. Remove 5 long Phillips head screws (figure 6-15), split washers, and flat washers.

b. Remove 2 short Phillips head screws, split washers, and flat washers, then remove power converter.

6-6.5 Power Converters

With the power supply printed circuit board subassembly removed, any power converter (U1 through U5) can be removed by using the following procedure:

a. Remove 5 long Phillips head screws (figure 6-15), split washers, and flat washers.

b. Remove 2 short Phillips head screws, split washers, and flat washers, then remove power converter.

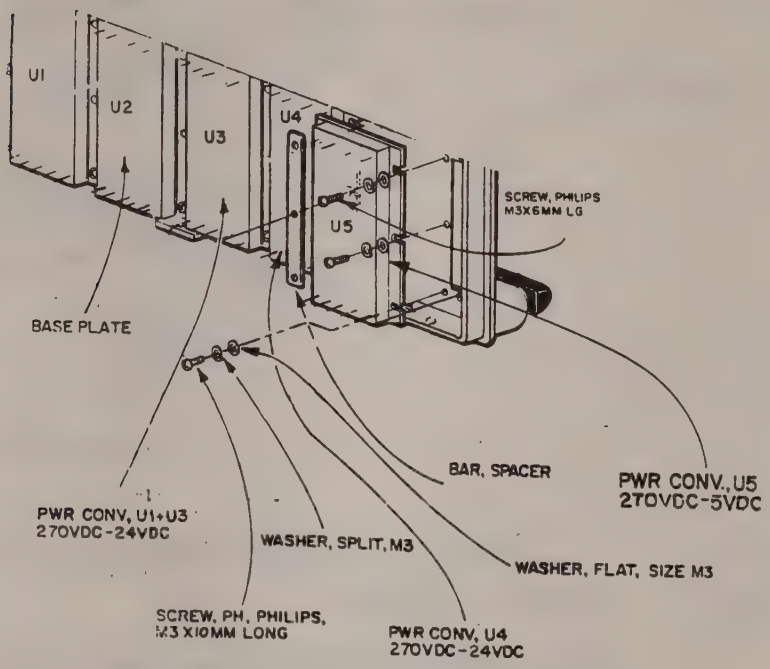


Figure 6-15. Power Converter Removal

6-6.6 SMA Connector Panel Subassembly

To remove and disassemble the SMA connector panel subassembly, use the following procedure:

NOTE

All connectors must be tagged for identification during reassembly.

a. From outside of rear panel assembly, unscrew 1/2-inch WSMA terminator (figure 6-16) from TRIGGER BUS SMA connector, remove 1 Phillips head screw and flat washer to remove terminator, then remove shakeproof washer.

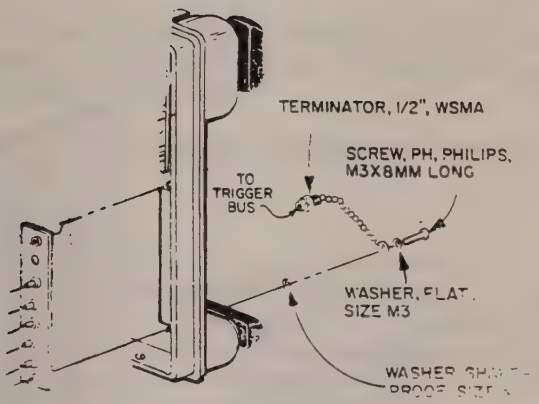


Figure 6-16. SMA Connector Panel Subassembly Removal

c. To disassemble SMA connector panel subassembly remove protective covers (figure 6-17) to remove 5 hex nuts and internal tooth lockwashers, then remove SMA connectors from panel.

b. Remove PROBE POWER hole plug.

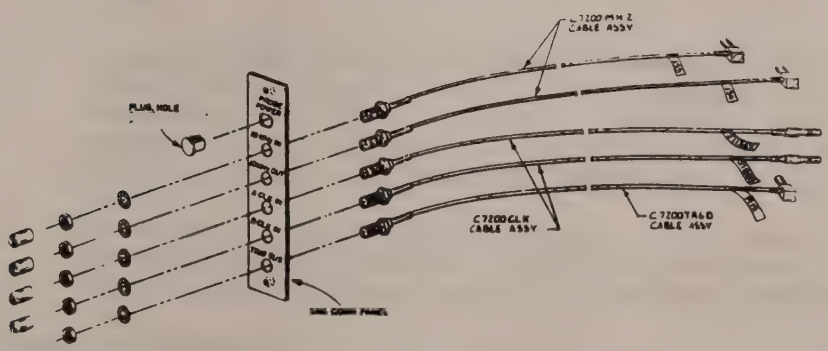


Figure 6-17. SMA Connector Panel Panel Subassembly Disassembly

6-6.7 Module Backplane Assembly

To disassemble the MFMB, use the following procedure:

a. From behind assembly (figure 6-18), remove 4 hex nuts and split washers that attach plug-in module locating pins to backplane.

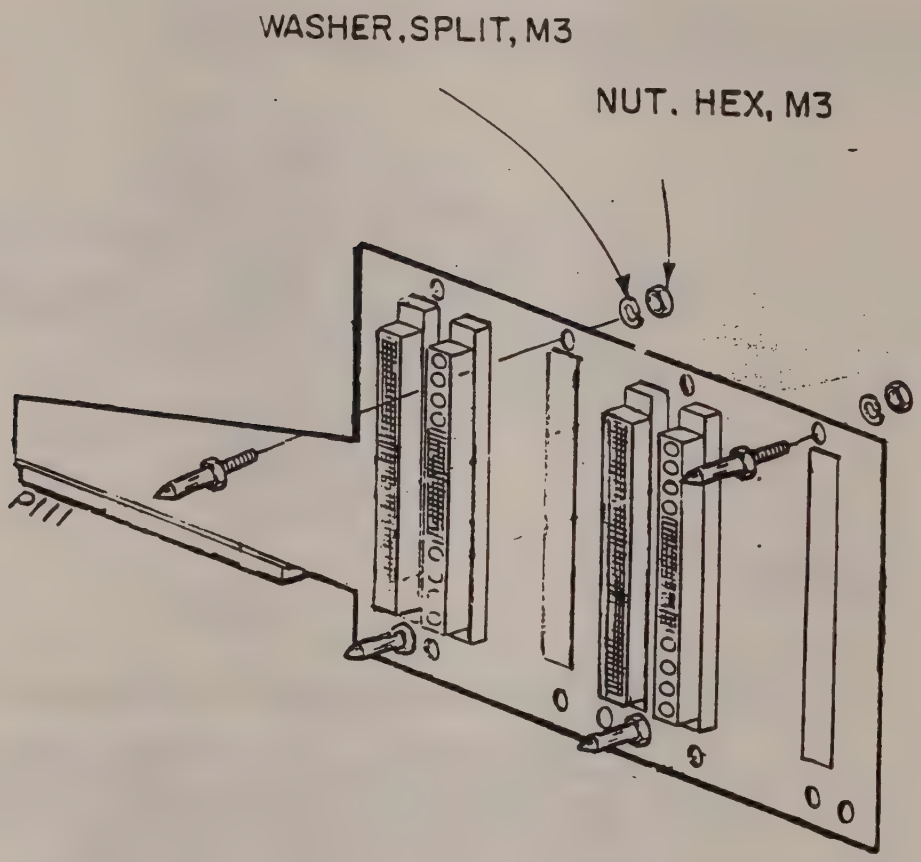


Figure 6-18. Module Backplane Assembly Disassembly

SECTION 7 REASSEMBLY

Reassembly is generally in the reverse order of disassembly. All hardware is tightened during reassembly to the torque limits specified in appendix D.

7-1 Module Backplane Assembly

To reassemble the module backplane assembly, use the following procedure:

a. Insert any plug-in module locating pin (see figure 6-18) through backplane from front and reinstall split washer and hex nut.

b. Repeat step a for three remaining plug-in module locating pins.

7-2 Rear

The Rear is reassembled by reassembling and reinstalling the SMA connector panel subassembly, reinstalling the power converters, reinstalling the power supply printed circuit board subassembly, reassembling and reinstalling the back panel interface, reinstalling the shield subassembly, and reinstalling the axial fans.

7-2.1 SMA Connector Panel Subassembly

To reassemble and reinstall the SMA connector panel subassembly, use the following procedure:

a. Reinstall **PROBE POWER** hole plug (see figure 6-17) in SMA connector panel.

b. Insert SMA connectors through SMA connector panel and reinstall 5 internal tooth lockwashers and hex nuts.

c. Position SMA connector panel assembly inside rear panel (see figure 6-16) for reinstallation of attaching hardware, then reinstall shakeproof washer, flat washer, and Phillips head screw in upper hole. DO NOT TIGHTEN SCREW.

d. Reinstall shakeproof washer, 1/2-inch WSMA terminator, flat washer, and Phillips head screw in lower hole. Tighten **BOTH** Phillips head screws.

7-2.2 Power Converters

To reinstall any power converter (U5 through U1), use the following procedure:

a. Position power converter against heat sink for reinstallation of attaching hardware (see figure 6-15), then reinstall 2 flat washers, split washers, and short Phillips head screws. DO NOT TIGHTEN SCREWS.

b. Reinstall 5 flat washers, split washers, and long Phillips head screws.

7-2.3 Power Supply Printed Circuit Board Subassembly

To reinstall the power supply printed circuit board subassembly, use the following procedure

a. Position power supply printed circuit board for reinstallation (see figure 6-14) and resolder power converters U5 through U1.

b. Reconnect power supply ground wires.

c. Reinstall 4 flat washers, split washers, and long Phillips head screws.

d. Reinstall 5 flat washers, split washers, and short Phillips head screws.

7-2.4 Back Panel Interface

To reassemble and reinstall the back panel interface, use the following procedure:

a. Position printer connector J142 against inside of back panel interface with ribbon cable oriented as shown in figure 6-13 and reinstall 2 hex standoffs from outside, then reinstall 2 lockwashers and hex nuts from inside.

b. Position RS-232 connector J143 against inside of back panel interface with ribbon cable oriented as shown in figure 6-13 and reinstall 2 hex standoffs from outside, then reinstall 2 lockwashers and hex nuts from inside.

c. Position GPIB connector J144 against inside of rear interface panel with ribbon cable oriented as shown in figure 6-13 and reinstall 2 hex standoffs from outside, then reinstall 2 flat washers, lockwashers and hex nuts from inside.

d. Remove nut (see figure 6-12), split washer, flat washer, and shakeproof washer from GND1 stud on REAR. Reinstall GND1 wire, shakeproof washer, flat washer, split washer, and nut.

e. Resolder wires to terminals of fused ac connector and voltage switch subassembly (see figure 6-13).

f. Position fused ac connector and voltage switch subassembly against inside of back panel interface for reinstallation of attaching hardware and reinstall 2 screws from front and 2 flat washers, lockwashers, and hex nuts from rear.

g. Reconnect AC input cable connector J133 (see figure 6-11) to P133 on power supply printed circuit assembly.

h. Reconnect voltage selection cable connector J132 to P132 on power supply printed circuit assembly.

i. Reconnect J131.

7-2.5 Shield Subassembly

To reinstall the shield subassembly, use the following procedure:

a. Position shield subassembly for reinstallation of attaching hardware (see figure 6-9) and reinstall 2 Phillips head screws.

b. Reconnect J135 and J134 (see figure 6-10).

7-2.6 Plug-In Compartment Axial Fans

To reinstall the plug-in compartment axial fans, use the following procedure:

a. Resolder any connections disconnected during overhaul and install new heat shrink tubing.

b. Position axial fan for reinstallation of attaching hardware (see figure 6-6) and reinstall finger guard, 4 flat washers, split washers, and Phillips head screws.

c. Position fan hood (see figure 6-8) for reinstallation of attaching hardware and reinstall flat washer, split washer, and Phillips head screw.

7-2.7 Card Cage Axial Fans

To reinstall the card cage axial fans, use the following procedure:

a. Position axial fan for reinstallation of attaching hardware and reinstall finger guard, 4 flat washers, split washers, and Phillips head screws.

b. Reconnect P136 to J136 on shield subassembly.

c. Remove nut (see figure 6-7) and shakeproof washer from GND2 stud on rear panel. Reinstall GND2 wire, shakeproof washer, and nut.

7-3 Hard Disk Drive Assembly

To reassemble the hard disk drive assembly, refer to figure 6-5 and use the following procedure:

a. Reinstall 2 grommets in disk mount.

b. Position hard disk drive as shown in illustration with connectors toward top of disk mount and reinstall 4 split washers and Phillips head screws.

7-4 CRT Assembly

To reassemble the CRT assembly, refer to figure 6-4 and use the following procedure:

With CRT faceplate facing you, reinstall yoke on neck of CRT with wires to left and slide forward as far as possible. Rotate yoke on neck of CRT until marks made during disassembly align, then tighten clamping screw **SLIGHTLY**.

7-5 Bottom Cover Assembly

If the bottom cover is equipped with the optional tilt stand kit, use the following procedure for reassembly:

a. Reinstall 10-inch wire rail (see figure 6-3), then reinstall left foot and right foot.

b. Reinstall 4 Phillips head screws up through feet, front stiffener, and bottom cover then reinstall 4 split washers and hex nuts.

c. Reinstall 2 Phillips head screws through 2 rear feet, rear stiffener, and bottom cover then reinstall 2 hex nuts.

7-6 Side Assemblies

The reassembly procedure is identical for both side assemblies. Do the following:

a. Position handle on outside (see figure 6-2) for reinstallation of attaching hardware, then reinstall 2 7-32 nuts.

b. Reinstall 2 10-32 nuts.

7-7 Front Panel Assembly

To reassemble the front panel assembly, use the following procedure:

a. Position printed circuit board assembly behind front panel for reinstallation of attaching hardware, then reinstall 5 split washers and Phillips head screws.

b. Reinstall 2 split washers and long Phillips head screws.

c. Compress mounting springs on power switch and snap into front of assembly.

d. At front of front panel assembly, reinstall Horizontal EXPAND knob. Allow sufficient clearance (.020 inches or approximately thickness of matchbook cover) between skirt of knob and front panel to prevent binding. Use nutdriver to tighten nut inside knob.

e. Reinstall Vertical EXPAND knob. Allow sufficient clearance (.020 inches) between skirt of knob and front panel to prevent binding. Use nutdriver to tighten nut inside knob.

f. Reinstall Select Cursor/Move Box/Next Topic knob. Allow sufficient clearance (.020 inches) between skirt of knob and front panel to prevent binding. Use nutdriver to tighten nut inside knob.

g. Reinstall Horizontal POSITION knob. Allow sufficient clearance (.020 inches) between skirt of knob and top of Horizontal EXPAND knob to prevent binding, then use flat-bladed screwdriver to tighten screw inside knob one-quarter turn.

h. Reinstall Vertical POSITION, and knobs. Allow sufficient clearance (.020 inches) between skirt of knob and top of Vertical EXPAND knob to prevent binding then use flat-bladed screwdriver to tighten screw inside knob one-quarter turn.

i. Reinstall Move Cursor/Modify Value/Next Line knob. Allow sufficient clearance (.020 inches) between skirt of knob and top of Select Cursor/Move Box/Next Topic knob to prevent binding, then use flat-bladed screwdriver to tighten screw inside knob one-quarter turn.

SECTION 8 INSTALLATION/REINSTALLATION

8-1 Floppy Disk Drive Assembly

Fujitsu M2532K-19A and M2532M-19A floppy disk drives are used as alternate replacements in the 7200 Mainframe. Certain changes must be made before a Fujitsu drive can be installed.

If the replacement drive is a Fujitsu M2532K-19A, refer to figure 3-5 and make the following changes:

a. On component side of circuit board, remove and reposition five shunts as shown.

b. On opposite side of circuit board, add jumper across JP5.

If the replacement drive is a Fujitsu M2532M-19A, make the following changes:

a. On solder side of circuit board (figure 8-1), add jumper between points shown.

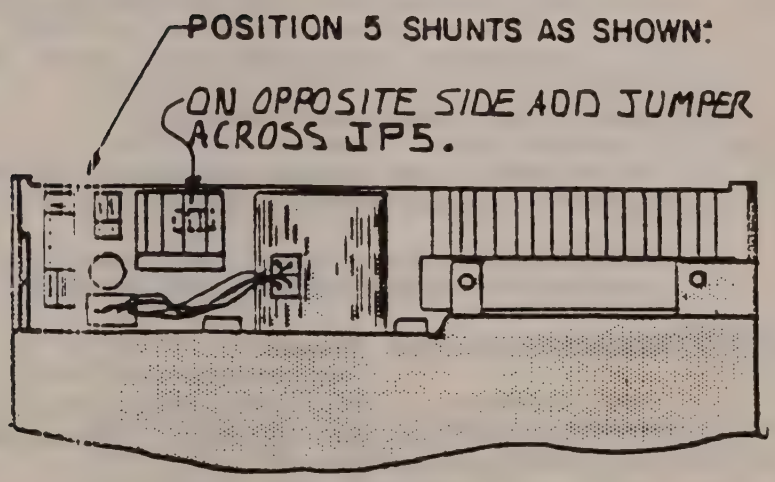


Figure 8-1. Fujitsu M2532M-19A Jumper Installation

b. On component side of circuit board (figure 8-2), remove and reposition two shunts as shown.

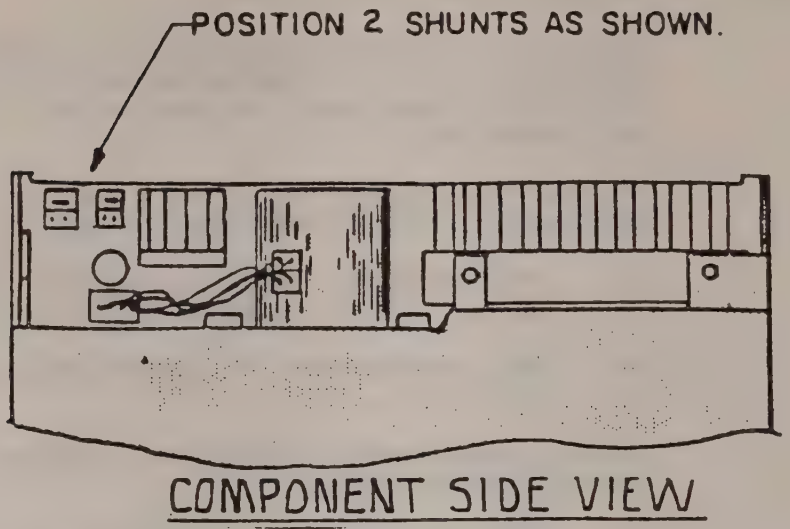


Figure 8-2. Fujitsu M2532M-19A Shunt Repositioning

c. Position floppy disk drive inside 7200 Mainframe for reinstallation of shield and attaching hardware, then reinstall floppy shield and floppy disk drive by reinstalling 4 flat Phillips head screws.

d. Reconnect JF34 (see figure 5-9) and JF4.

8-2 Main Frame Backplane Assembly

To reinstall the Mainframe backplane assembly, refer to figure 5-12 and use the following procedure:

Position Mainframe backplane assembly under card cage and reinstall 9 split washers and Phillips head screws.

8-3 Module Backplane Assembly

The reassembled module backplane assembly is reinstalled at the back of the plug-in compartment by using the following procedure:

a. Plug P111 into J111 on Mainframe backplane assembly.

b. Place alignment fixture on module guide firmly. Insert locating pins into fixture and align mounting holes in module with mounting holes in wireframe.

With alignment fixture in place, refer to figure 5-11 and reinstall 6 split washers and Phillips head screws.

8-4 Central Processing Unit Board Assembly

To reinstall the CPU (CPUA) board, use the following procedure:

a. Position CPU (CPUA) board for insertion into VME bus connectors P1-1 and P2-1 on Mainframe backplane assembly (see figure 5-10), then push down firmly until seated and ejectors latched.

8-5 System Clock Board Assembly

To reinstall the S-Clock, use the following procedure:

a. Position S-Clock for insertion into VME bus connector P1-5 on Mainframe backplane assembly (see figure 5-10), then push down firmly until seated.

b. Reconnect P52, P53, P54, and P55 (see figures C-1 and C-2).

8-6 Hard Disk Drive Assembly

To reinstall the reassembled hard disk drive assembly, use the following procedure:

a. Reinstall hard disk drive assembly with grommets in bottom of disk mount over locating pins on Mainframe backplane assembly (see figures 5-8 and 5-9).

b. Reinstall connectors JH34, JH20, and J42 (see figure C-1 and C-2.

8-7 DC Power Board Subassembly

To reinstall the DC power board subassembly, use the following procedure:

a. Position DC power board subassembly for insertion into VME bus connector P1-6 on Mainframe backplane assembly (see figure 5-10), then push down firmly until seated.

b. Reconnect P41 and P43 (see figures C-1 and C-2).

8-8 Peripheral Control Board Assembly

The PCON board has jumpers and switches which are used to configure it for use with specific types of floppy drive assemblies. If the floppy drive assembly has been replaced, jumper positions and switch settings on the PCON board must be checked and changed if necessary. To reinstall the PCON board, use the following procedure:

a. Check jumper positions and switch settings to be sure PCON board is configured correctly.

b. Position PCON board for insertion into VME bus connectors P1-10 and P2-10 on Mainframe backplane assembly (see figure 5-10), then push down firmly until seated.

c. Reconnect PH34 (see figure C-2) and PH4.

8-9 Display Board Assembly

To reinstall the display board assembly, use the following procedure:

a. Position display board assembly for insertion into VME bus connectors P1-12 and P2-12 on Mainframe Backplane Assembly (see figure 5-10), then push down firmly until seated.

b. Reconnect P21, P22, P23, and P24 (see figure C-2).

8-10 CRT Assembly

To reinstall the CRT assembly, use the following procedure:

a. Slide CRT with deflection yoke and video display adapter attached into 7200 Mainframe and reinstall 4 flat washers, split washers, and Phillips head screws which attach CRT assembly to wire frame.

b. Connect J5 (figure 5-5) to P5 on DSPL board.

c. Connect J4 to P4 on DSPL board.

8-11 Bottom Cover Assembly, Side Assemblies, Rear Panel Assembly, Front Panel Assembly, and Top Cover

To reinstall these items, use the following procedure:

a. Rotate 7200 Mainframe 90 degrees so that bottom faces you, then position bottom cover assembly for reinstallation of attaching hardware. Refer to figure 5-4 and reinstall 1 flat washer, 1 lockwasher, and 1 flat Phillips head screw.

c. Rotate 7200 Mainframe to upright position and position left side assembly for reinstallation of attaching hardware (see figure 5-4). Reinstall 2 flat Phillips head screws to attach left side assembly to bottom cover assembly.

d. Refer to figure 5-3 and reinstall 5 flat head screws to attach left side assembly to heat sink of display board assembly.

e. Position right side assembly for reinstallation of attaching hardware. Reinstall 2 flat Phillips head screws.

f. Position Rear in Mainframe for reconnection of connectors and reinstallation of attaching hardware (see figure 4-3 and follow steps in paragraph 5-6 in reverse order). After reconnection of all connectors, reinstall Rear with 8 flat Phillips head screws.

8-12 7210 Removable Hard Drive Assembly

To install a LeCroy Model 7210 Removable Hard Drive Assembly, use the following procedure:

a. Press 0 on front panel power switch (see figure A-1 for location) to remove power from 7200 Mainframe, then disconnct line cord from wall receptacle as shown in figure 8-3.

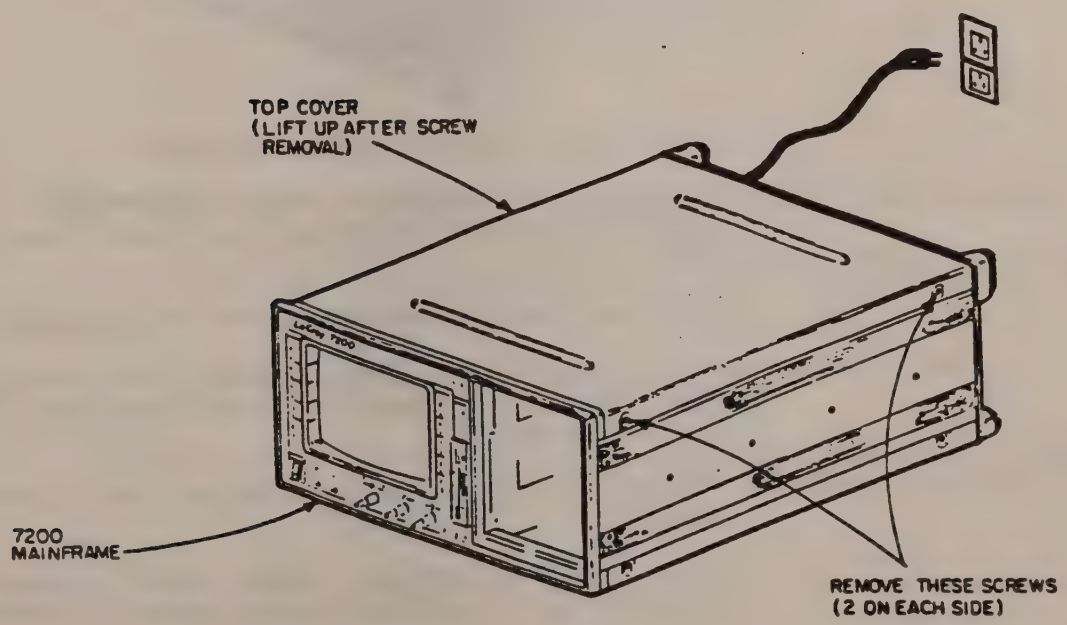


Figure 8-3. Power Disconnection

b. Remove four screws from top cover as shown in figure 2-4 and lift up to remove.

c. Remove three screws from each of two hold down bars (figure 8-4) on top of card cage assembly and remove hold down bars.

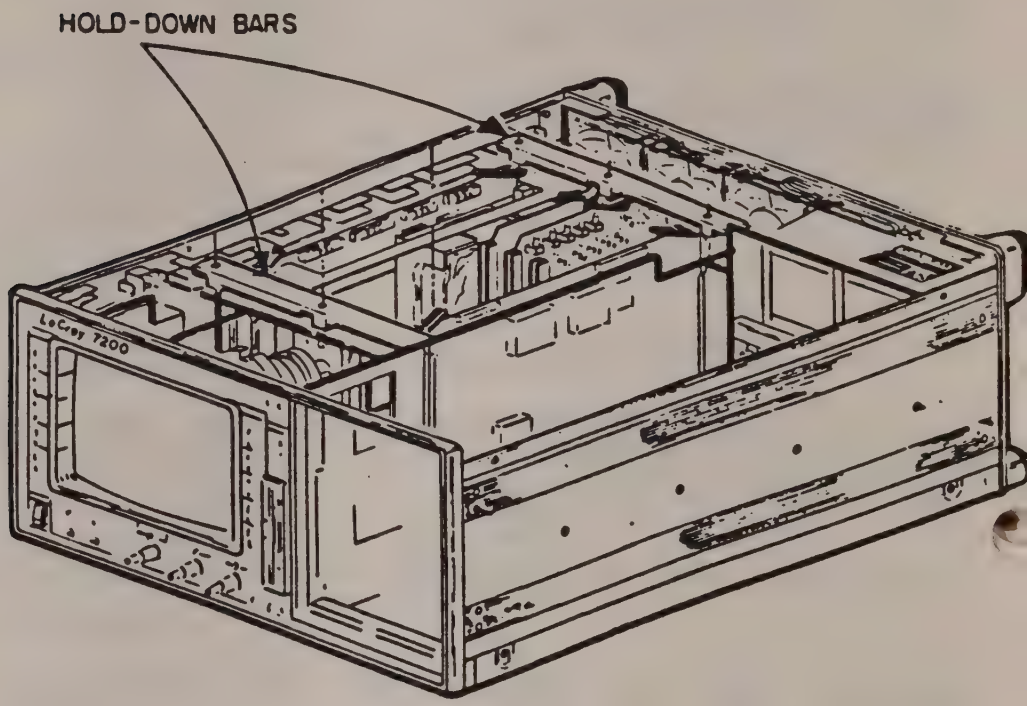


Figure 8-4. Hold Down Bar Removal

d. Disconnect J22 and J23 (see figures 5-9, C-1, and C-2) which connect internal hard disk drive to PCON board.

e. Disconnect cable that connects J42 and JHD.

f. Remove hard disk drive assembly by referring to paragraph 5-4.3, figure 5-8 and figure 5-9. Save all hardware removed.

g. Reinstall two hold down bars on top of card cage assembly.

h. Unpack 7210 Removable Hard Drive Assembly and position for installation as shown in figure 8-5.

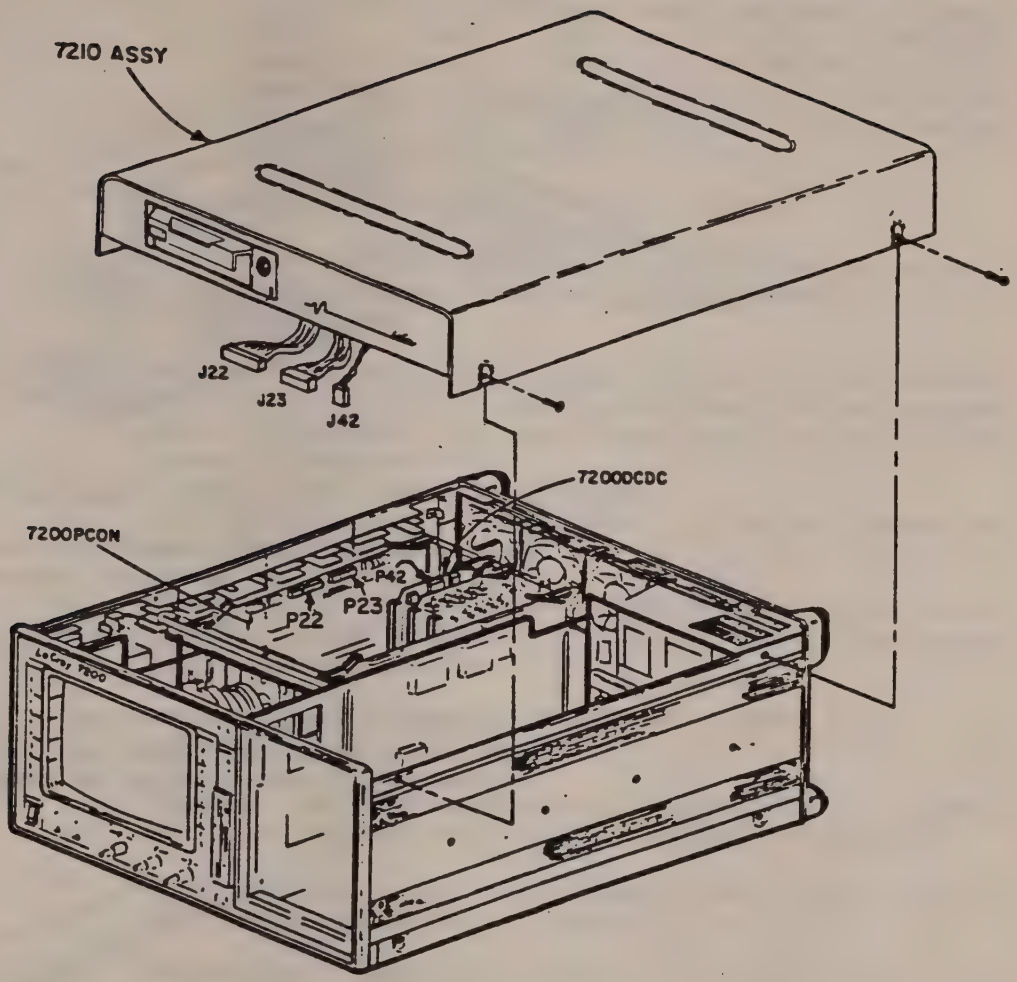


Figure 8-5. 7210 Removable Hard Drive Assembly Installation

i. Refer to figures C-1 and C-2. Connect J42 to P42 on DC-DC board. Connect J23 and J22 to P23 and P22 on PCON board.

j. Lower Assembly into place and reinstall four screws removed in step b.

k. Use key provided (see figure 8-6) to unlock "Magic-Pak" slide and remove by pulling on handle.

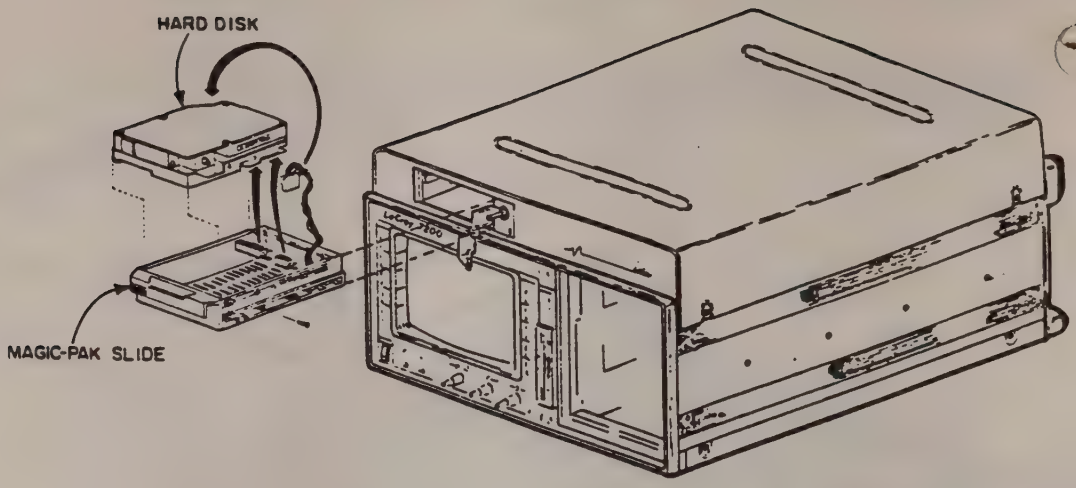


Figure 8-6. Hard Disk Drive Installation

l. Install hard disk drive on "Magic-Pak" slide by reinstalling hardware removed in step f.

m. Connect three cables on "Magic-Pak" slide to hard disk drive.

n. Reinstall "Magic-Pak" slide and hard disk drive assembly by reinserting into 7210 assembly (see figure 8-7) and locking by turning key. Remove key.

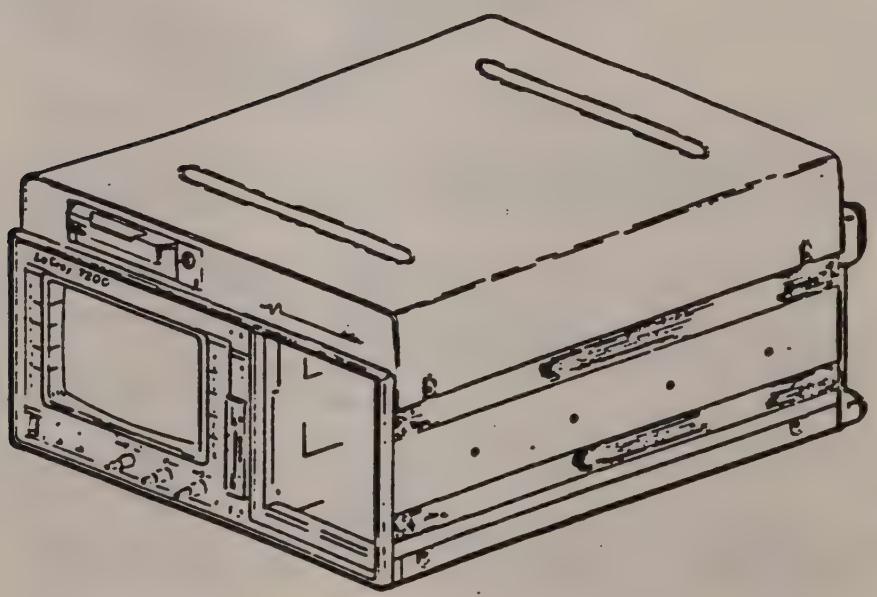


Figure 8-7. "Magic-Pak" Reinstallation

o. Plug line cord into wall receptacle and press 1 on 7200 Mainframe power switch to apply power. Check operation. If Assembly malfunctions or does not operate at all, disassemble and check all connectors in "Magic-Pak" and inside card cage for proper seating and pin-to-pin compatibility.

8-13 7210-ED Removable Hard Disk Drive Assembly

To install a LeCroy Model 7210-ED Hard Disk Drive in a LeCroy Model 7210 Removable Hard Drive Assembly, use the following procedure:

a. Press 0 on front panel power switch (see figure A-1 for location) to remove power from 7200 Mainframe, then disconnct line cord from wall receptacle as shown in figure 8-3.

b. Use key to unlock "Magic-Pak" slide and remove by pulling on handle.

c. Disconnect three cables (see figure 8-6) which connect hard disk drive assembly to "Magic-Pak" slide.

d. Remove four screws to remove hard disk drive assembly.

e. Install new 7210-ED Removable Hard Drive Assembly by reinstalling four screws removed in step d.

f. Connect three cables on "Magic-Pak" slide to hard disk drive as shown in figure 8-6.

g. Reinstall "Magic-Pak" slide and hard disk drive assembly by reinserting into 7210 assembly (see figure 8-7) and locking by turning key. Remove key.

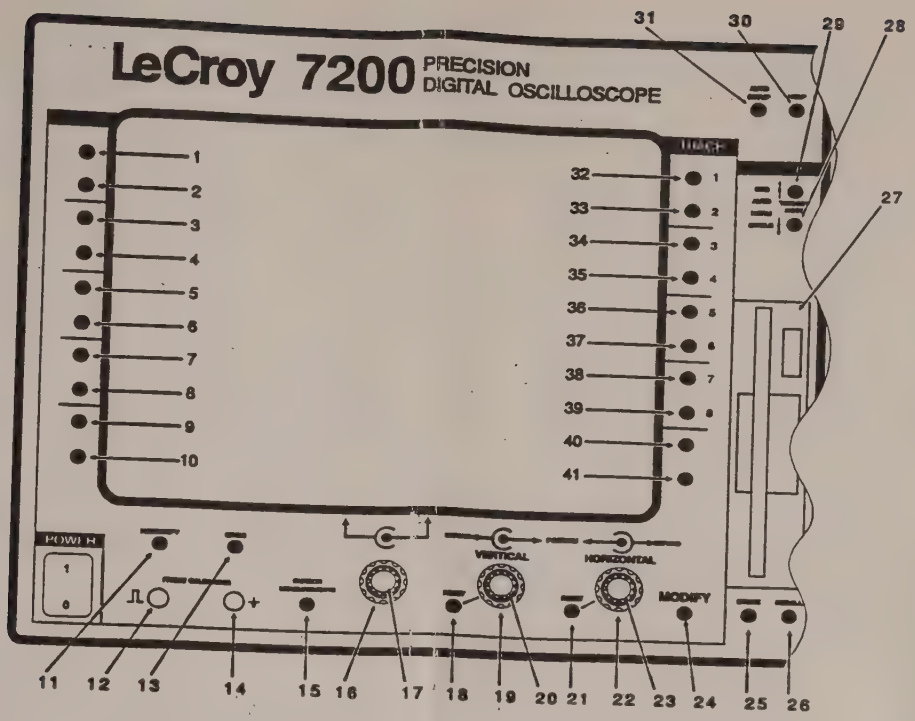
h. Plug line cord into wall receptacle and press 1 on 7200 Mainframe power switch to apply power. Check operation. If Assembly malfunctions or does not operate at all, disassemble and check all connectors in "Magic-Pak" and inside card cage for proper seating and pin-to-pin compatibility.

i. Update system configuration by inserting installation disk 1 (of 3) into floppy drive of 7200 Mainframe and pressing 1 on 7200 Mainframe power switch. System configuration updated automatically as part of initialization process. When complete, installation menu and **BRAM PARAMETERS VALIDATED** message displayed.

k. Remove installation disk 1 and press **Exit** softkey.

APPENDIX A

FRONT PANEL



1 **Record Traces** softkey on the Main Screen.
2 **Softkey** function will change.
3 **Learn Program** softkey on the Main Screen
4 **Softkey** function will change.
5 **Softkey** function will change.
6 **Softkey** function will change. See setup screens.
7 **Configure System** softkey on the Main Screen
8 **Softkey** function will change. See setup screens.
9 **Softkey** function will change. See setup screens.
10 **Softkey** function will change. See setup screens.
11 **HARDCOPY** key.
12 **PROBE CALIBRATOR** lug.
13 **GRIDS** key
14 **GROUND LUG.**
15 **CURSOR MEASUREMENTS** key
16 **Select Cursor** knob **Move Box** knob **Next Topic** knob. See setup screens.
17 **Move Cursor** knob **Modify Value** knob. **Next Line** knob See setup screens.
18 Vertical **RESET** key
19 Vertical **EXPAND** knob.
20 Vertical **POSITION** knob.
21 Horizontal **RESET** key
22 Horizontal **EXPAND** knob
23 Horizontal **POSITION** knob
24 **MODIFY** key
25 **STORE** key
26 **RECALL** key
27 MS-DOS compatible **3.5" floppy diskette drive.**
28 Lower **TRIGGER MODE** key
29 Upper **TRIGGER MODE** key.
30 **HELP** key
31 **AUTO SETUP** key
32 – 39 **TRACE** keys
40 **Softkey** function will change. See setup screens.
41 **Softkey** function will change. See setup screens.

Figure A-1. Front Panel

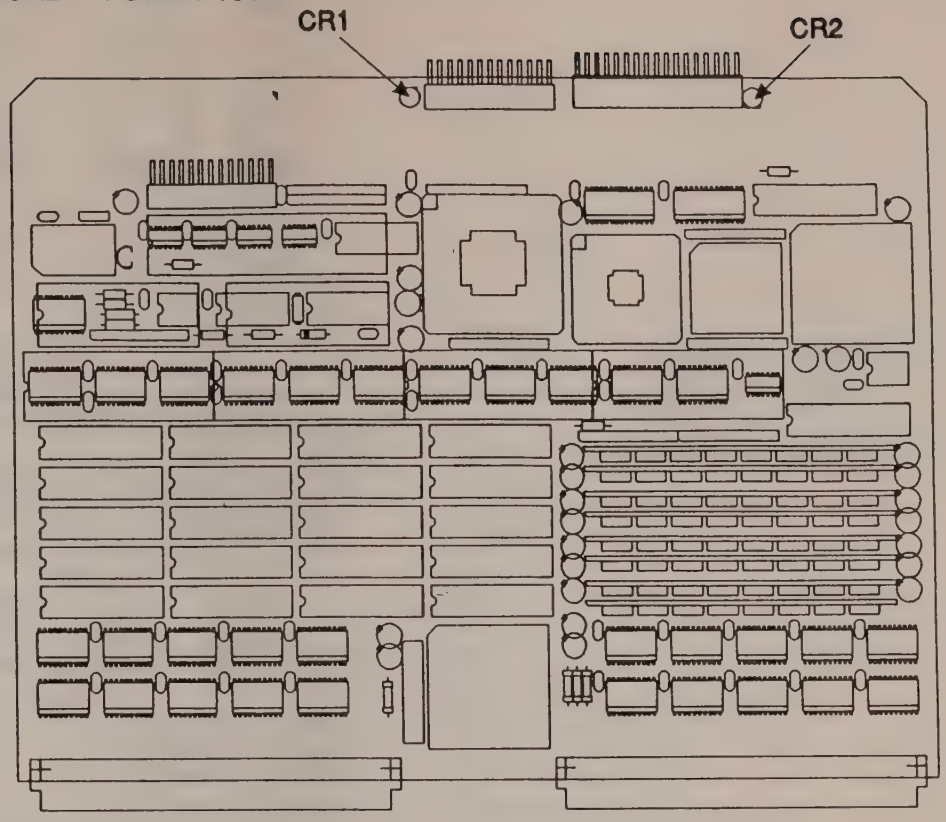
APPENDIX B

BOARDS

7200CPU

CR1 = BUS ACTIVE (LIFE)

CR2 = POWER +5V



7200CPUA

CR1 = POWER +5VDC

CR2 = BUS ACTUVE (LIFE)

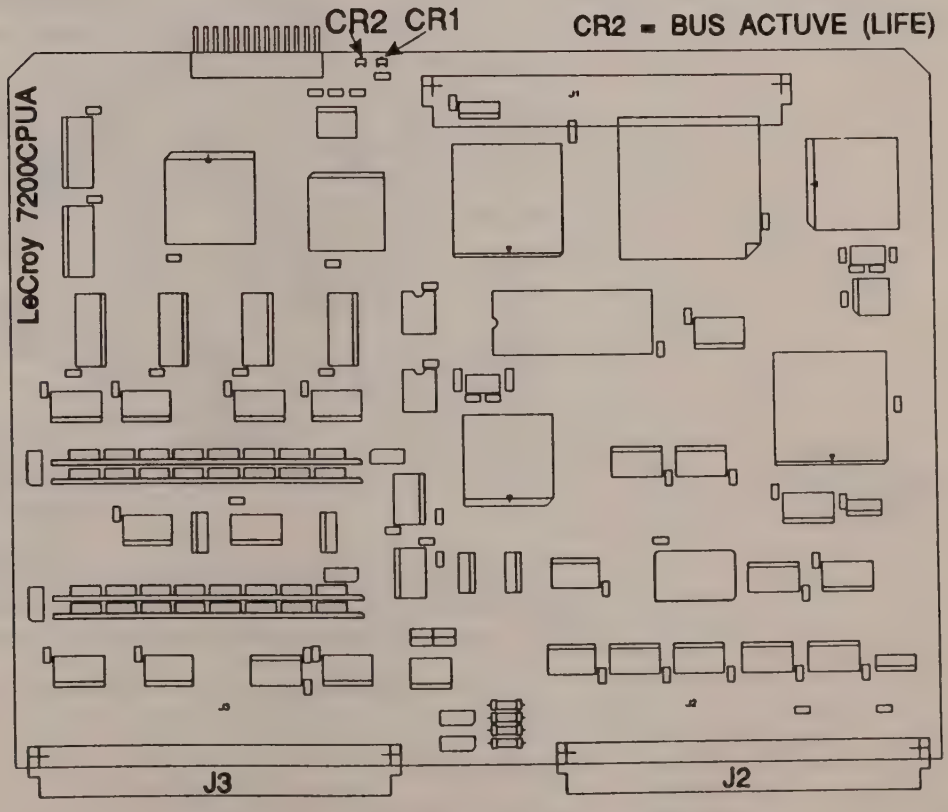


Figure B-1. CPU and CPUA Boards

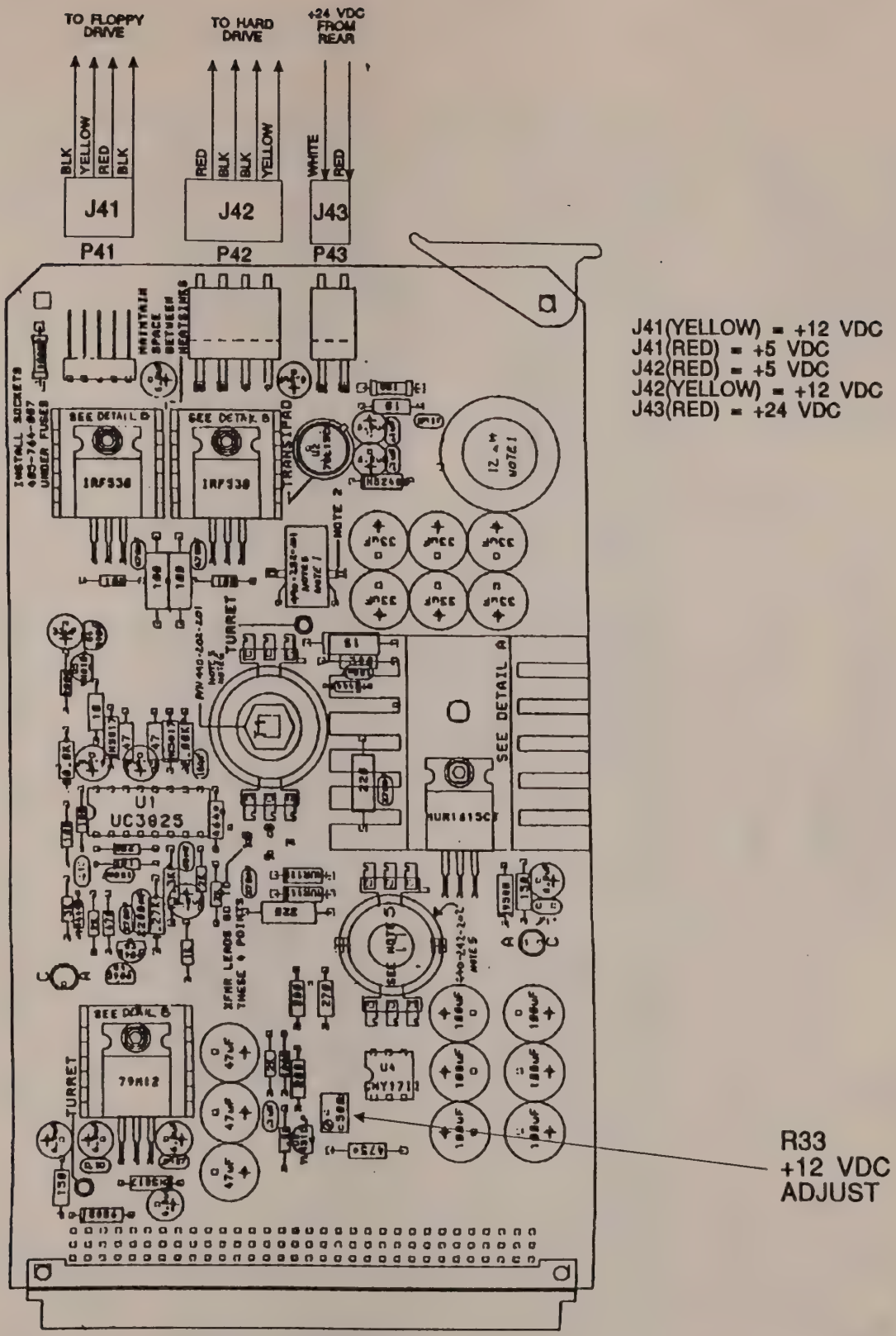


Figure B-2. DC/DC Converter Board

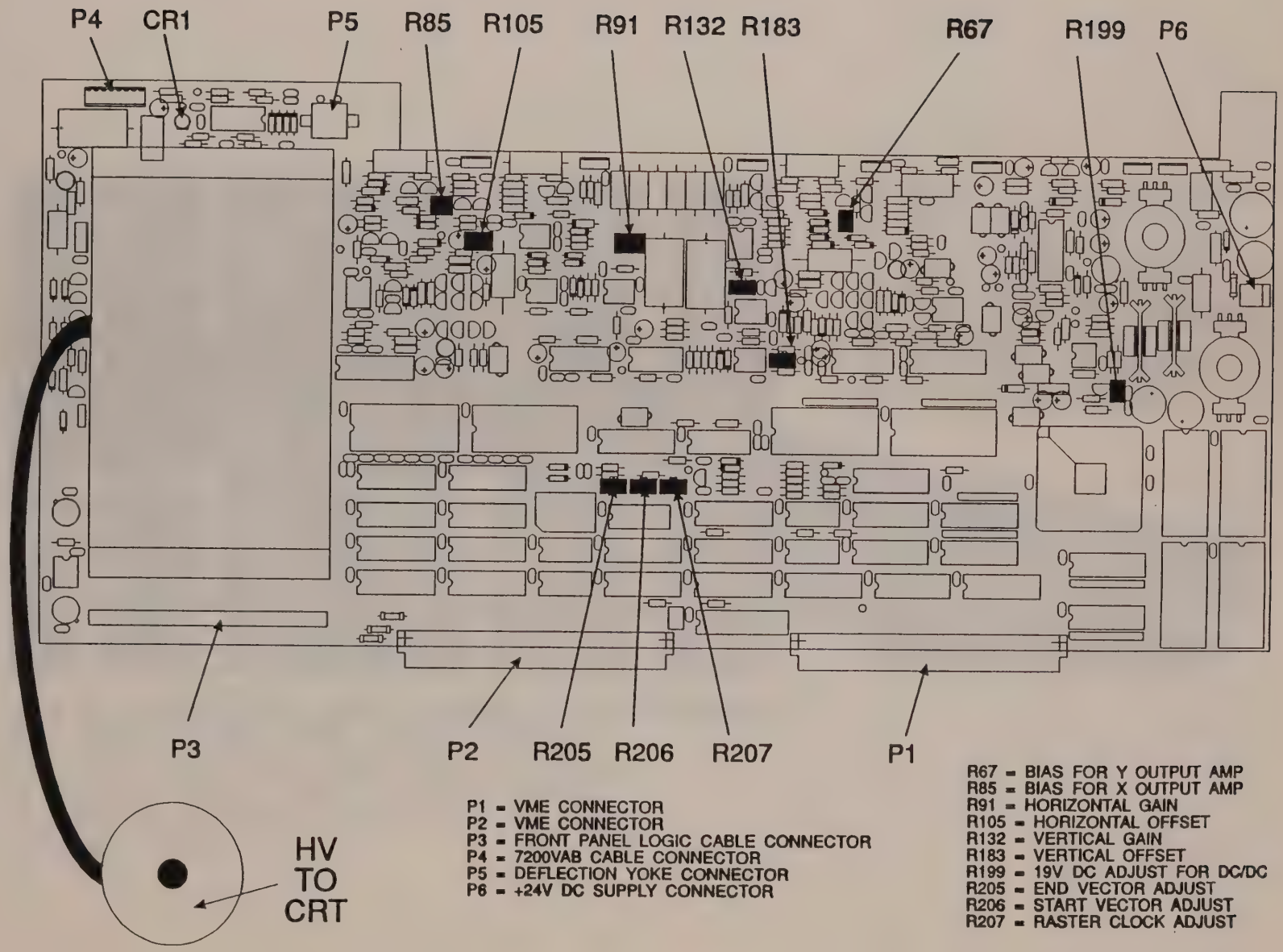
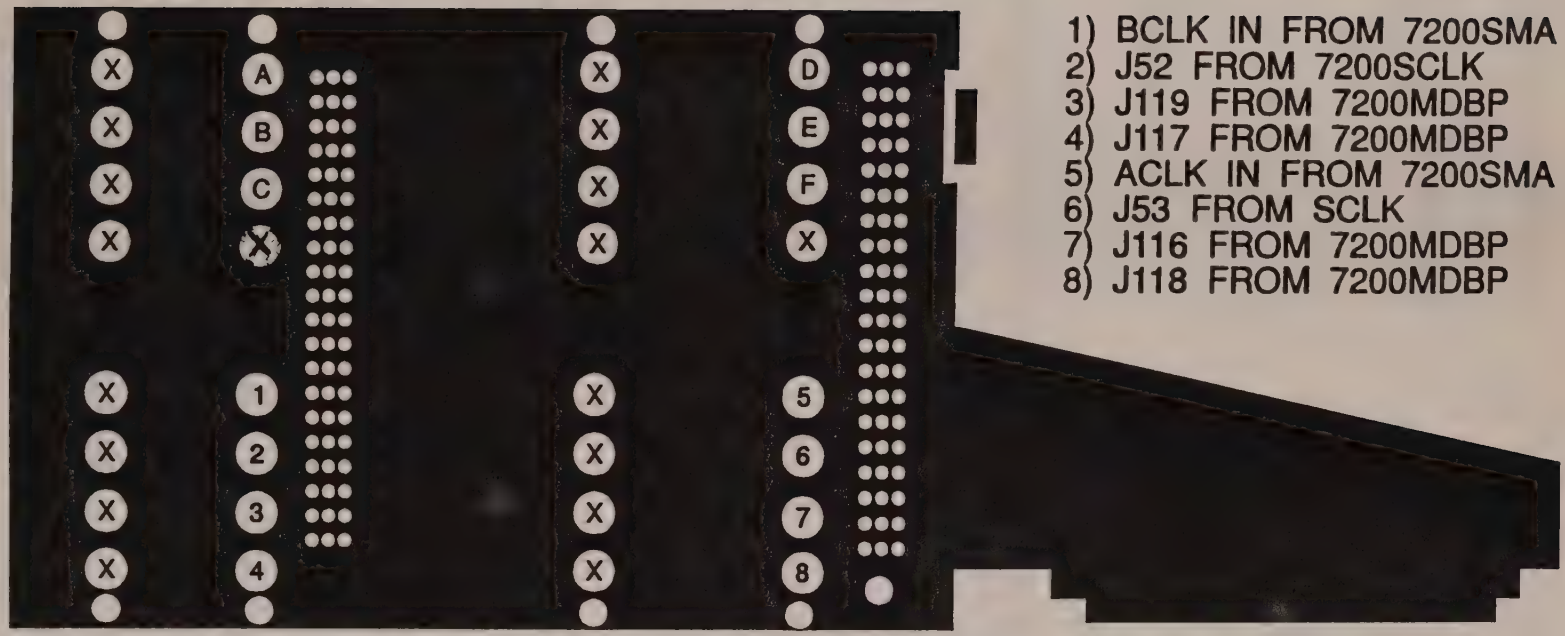


Figure B-3. DSPL Board



A & D = WHITE/BLK (GND2) WIRES FROM 7200REAR
B = RED (P113B2) WIRE FROM 7200REAR
C = WHITE (P113B3) WIRE FROM 7200REAR
E = RED (P113A2) WIRE FROM 7200REAR
F = WHITE (P113A3) WIRE FROM 7200REAR
X = NOT USED

Figure B-4. MDBP

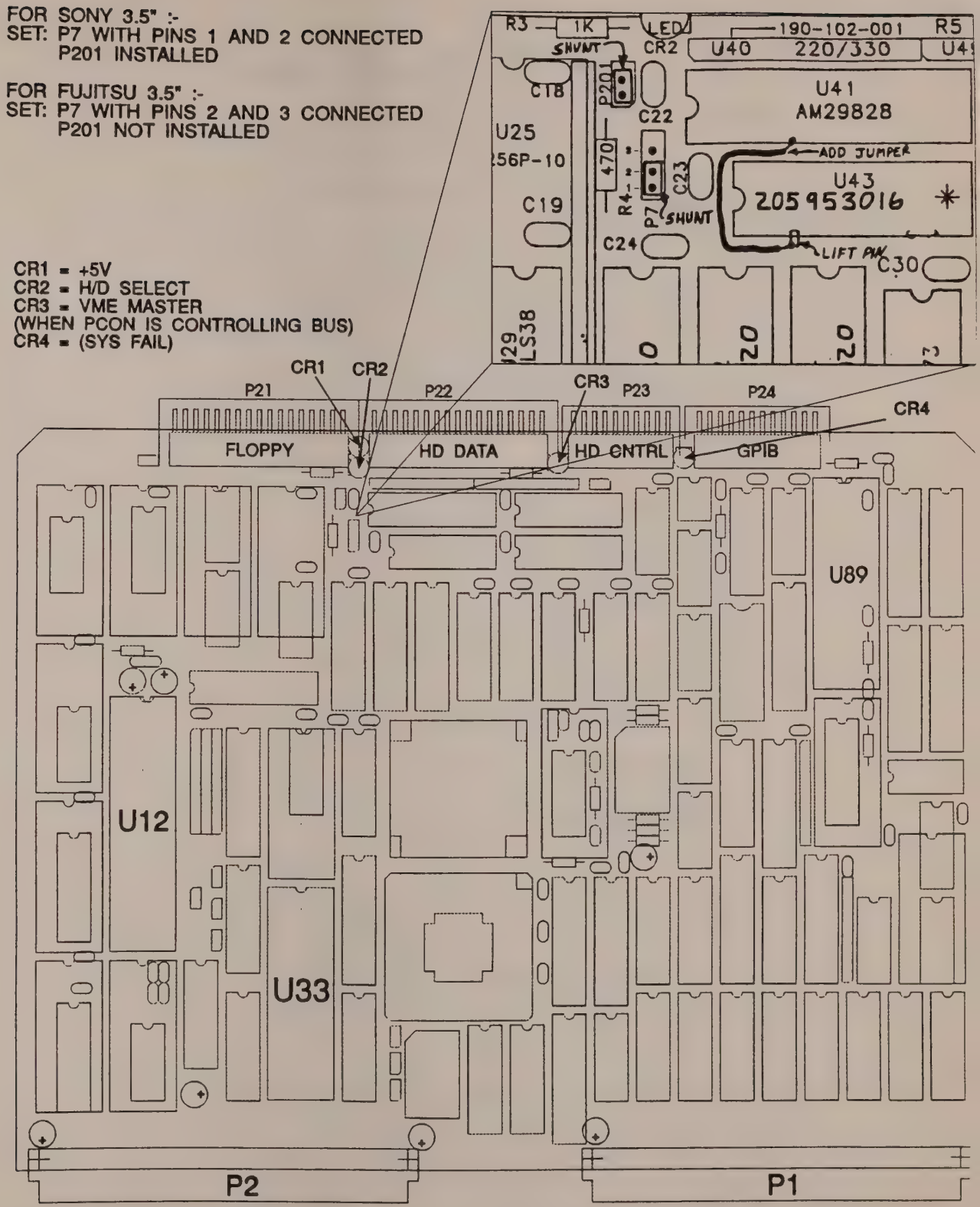


Figure B-5. PCON Board

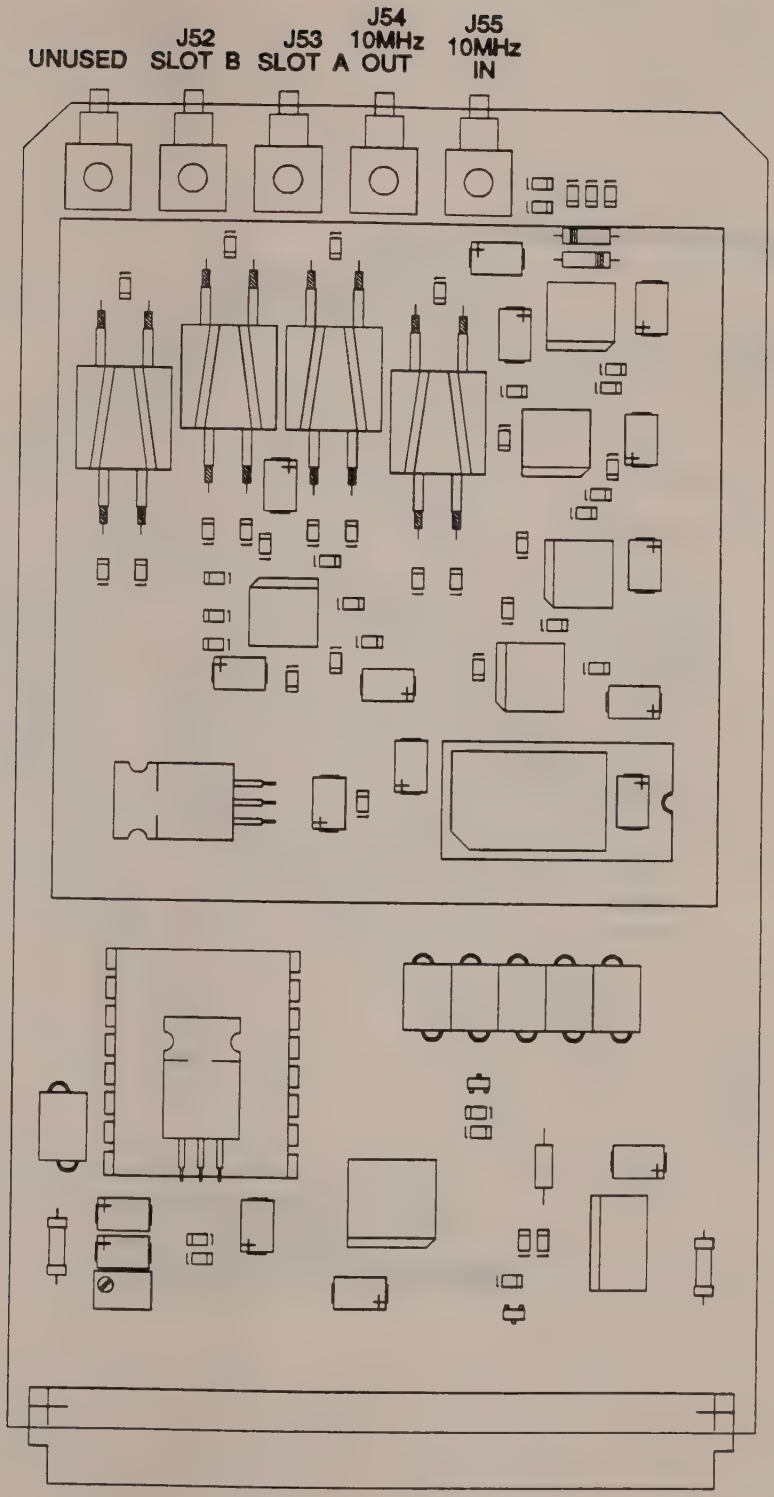
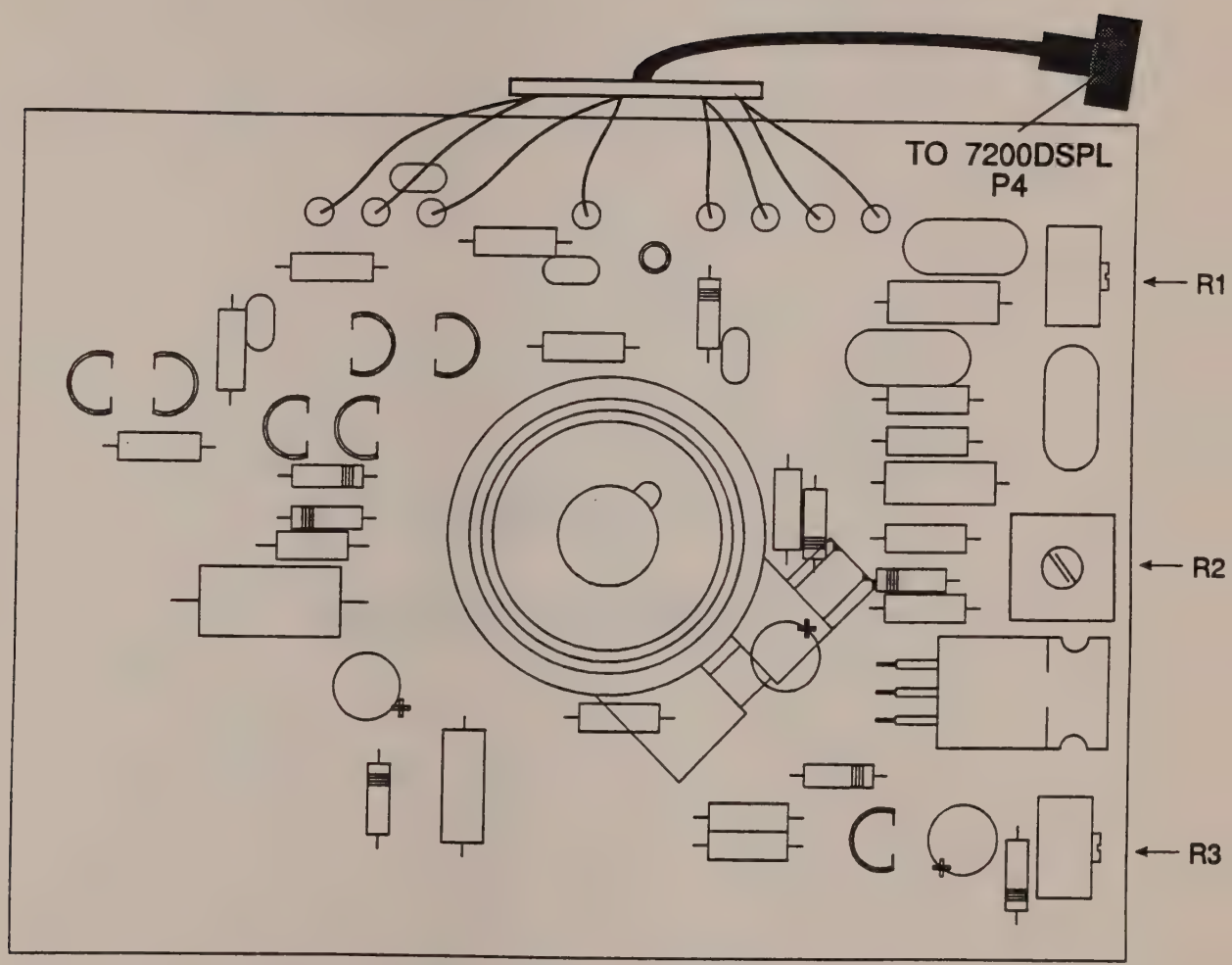


Figure B-7. SCLK Board



R1 = DISPLAY FOCUS
R2 = UNUSED
R3 = DISPLAY INTENSITY

Figure B-8. VAB

APPENDIX C

WIRING DIAGRAMS

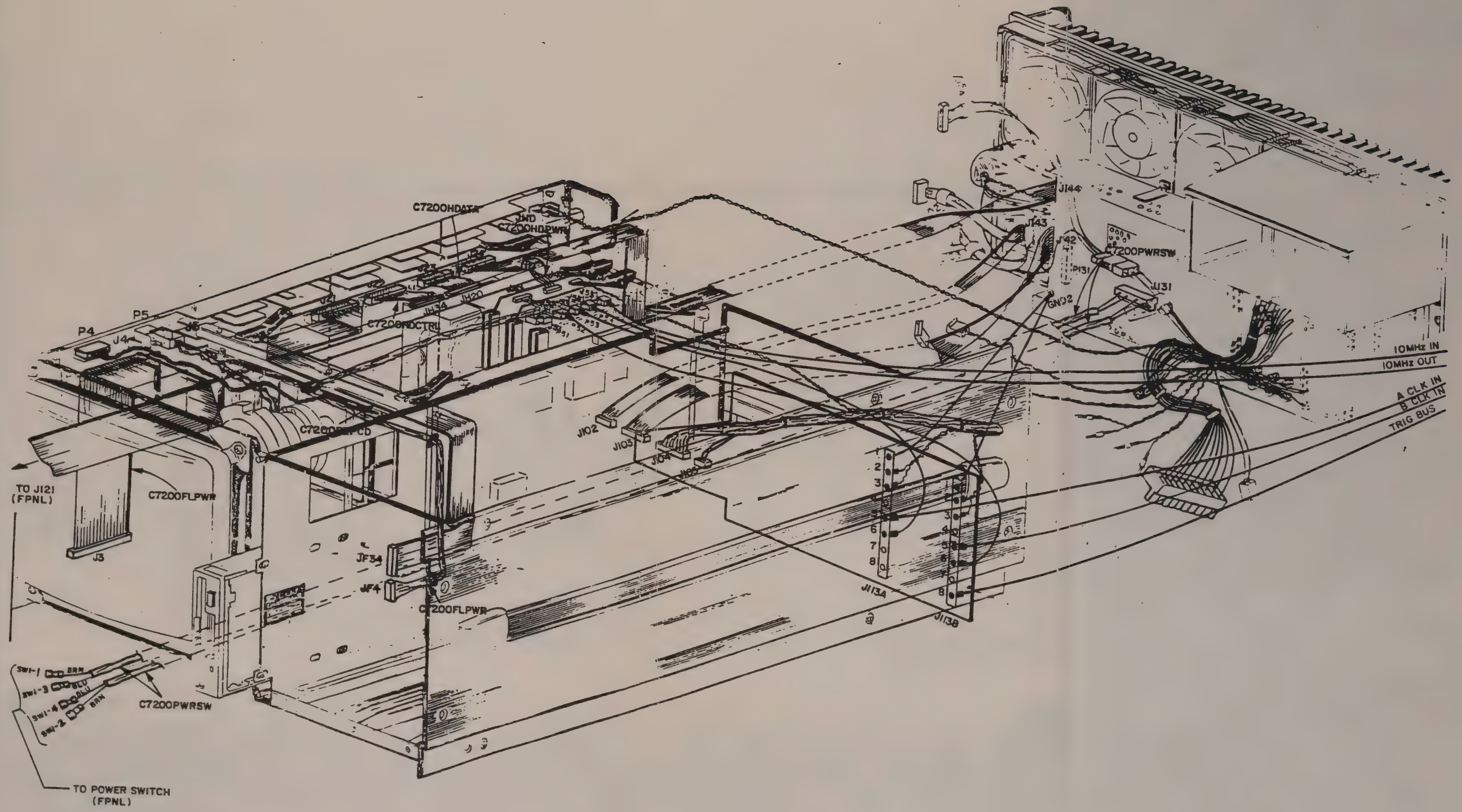


Figure C-1. Wiring Diagram

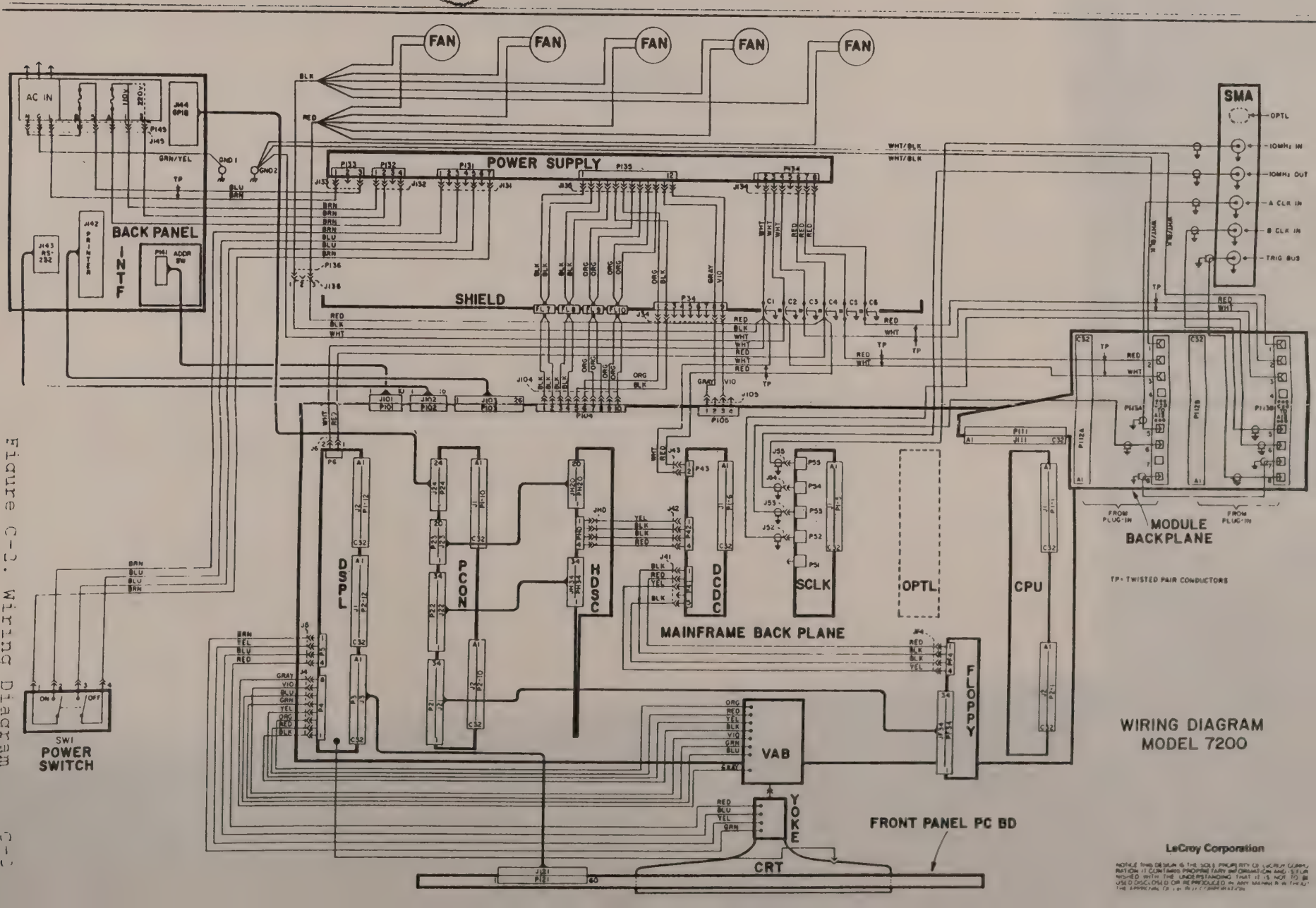


Figure C-2. Wiring Diagram

APPENDIX D

TORQUE VALUES

TORQUE SPECIFICATIONS

7200MAIN ASSEMBLY

3 INCH LB	BOTTOM REAR FEET TO BOTTOM COVER (M3)
8 INCH LB	HOLD DOWN BARS TO WIRE CAGE (M3) DISPLAY BD ASSY TO SIDE PANEL (M3) TILT STAND TO BOTTOM COVER (M3) DISK DRIVE TO DISKMOUNT (6-32)
10 INCH LB	TOP COVER TO SIDE PANELS (M3) BOTTOM COVER TO SIDE PANELS (M3) BOTTOM COVER TO WIRE CAGE (M3)
11 INCH LB	FRONT PANEL ASSY TO SIDE PANELS (M4) REAR PANEL ASSY TO SIDE PANELS (M4)

7200CAGE ASSEMBLY

6 INCH LB	PLASTIC RAILS TO WIRE CAGE (M2.5) SHIELD BRACKET TO MFBP BD ASSY (M3) CARD GUIDE TO MFBP BD ASSY (M3)
8 INCH LB	LOCATING PINS TO WIRE CAGE (M3) FLOPPY DRIVE TO WIRE CAGE (M3) MDBP BD ASSY TO WIRE CAGE (M3) MFBP BD ASSY TO WIRE CAGE (M3)
11 INCH LB	SIDE PANELS TO WIRE CAGE (M4) CRT ASSY TO WIRE CAGE (M4) HANDLE TO SIDE PANEL (#6 & #10 HEX NUT)

7200REAR ASSEMBLY

3 INCH LB	REAR RUBBER FEET TO REAR CASTING (M3)
8 INCH LB	FANS TO REAR CASTING (M3) FAN HOOD TO REAR CASTING (M3) VICOR MODULES TO REAR CASTING (M3) PWR BD TO REAR CASTIMG (M3) PWR SHLD ASSY TO REAR CASTING (M3) BPIFA TO REAR CASTING (M3) SMA TO REAR CASTING (M3) CHASSIS GND CABLE TO REAR CASTING (M4 HEX NUT)

TORQUE SPECIFICATIONS

7200BPIFA ASSY

7 INCH LB	RS232 CABLE ASSY TO BPIFA PANEL PRINTER CABLE ASSY TO BPIFA PANEL GPIB CABLE ASSY TO BPIFA PANEL AC RECEPTACLE TO BPIFA PANEL

7200FRNT ASSY

7 INCH LB	FPCB ASSY TO FRONT CASTING (M3)
2 INCH LB	KNOBS TO SHAFTS

NOTE: M2 SCREWS (2 PLACES) TO MOUNT FPCB TO FRONT CASTING MUST BE TORQUED JUST ENOUGH NOT TO DEFLECT PC BD.

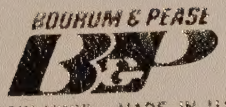
7200 PC BD ASSY'S

7 INCH LB	VME CONNECTORS TO MDBP ASSY (M2.5) LOCATING PINS TO MDBP ASSY (M3) LOCATING PINS TO MFBP ASSY (M3) FPCBB ASSY TO FPCB ASSY (M3) H-V SHIELDS TO DSPL BD (M3) DSPL HEATSINK TO DSPL BD (M3)

7200SHLD ASSY

5 INCH LB	SET-SCREWS OF CONNECTORS: J104, J134 & J135
8 INCH LB	#4 MTG HDWR FOR CONNECTOR J34

Beaverite Products, Inc.
1-800-626-3138
1859581 1-90



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